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# MISSOURI BOTANICAL GARDEN BULLETIN

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# MISSOURI BOTANICAL GARDEN

# Bulletin

January 1966
Volume LIV
Number 1

FRONT COVER

The new water lily pools constructed in 1964 show clearly in this recent view from an unusual vantage point — the top of the Climatron.

PHOTO BY MARK PADDOCK

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# Missouri Botanical Garden Bulletin

Vol. LIV No. 1 January 1966

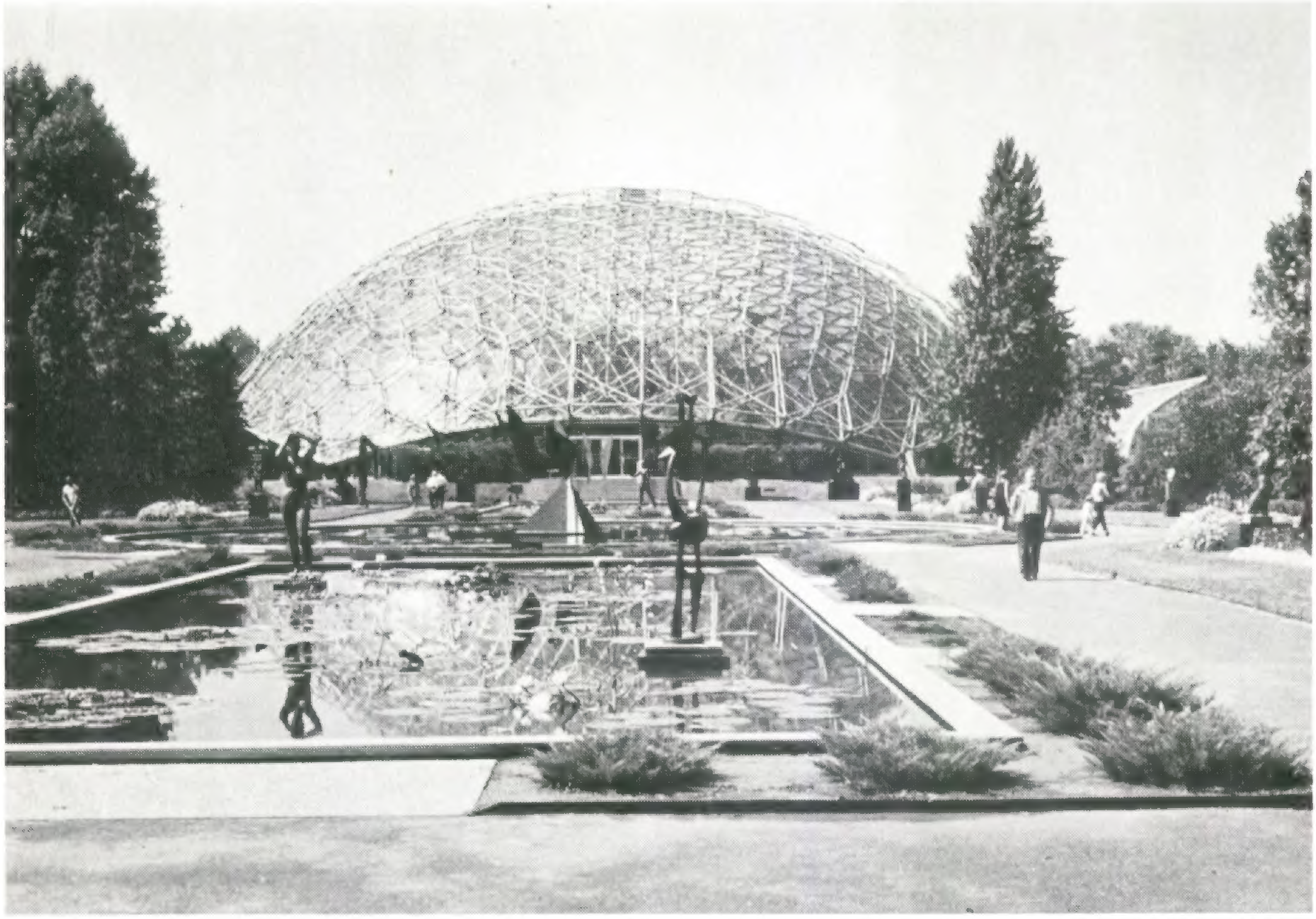
## ANNUAL REPORT OF THE DIRECTOR

THE purpose of the Annual Report is to put into the record the state of affairs of the Garden for the current year. In this way the Board of Trustees are given a written statement by the Director and the public is kept informed of progress within the institution.

I can start with nearly the same opening statement as did Dr. William Trelease who wrote on 14 January 1890: "On assuming control of the Garden, on the 12th of September last, I found that much work was necessary to place many parts of the establishment in repair, so as to insure their preservation." I began my duties on 7 September instead of the 12th, and I am pretty certain I found things in better repair than did Dr. Trelease 75 years ago. In fact I should like to express my gratitude to Henry Hitchcock, President of the Board of Trustees, and Leicester B. Faust, Vice President, for their devoted efforts during the two years the Garden was without a Director.

The Director's residence was redecorated, air-conditioning installed, and the grounds around it put in first rate condition. For this we are most grateful to the Board of Trustees and in particular to A. Timon Primm III who served as liaison between the Board and the contractors.

The past year, 1965, was a good one for the Garden. Total attendance recorded by the main gate turnstiles was approximately 490,000 persons, the largest for any single year in the history of the institution A pleasant summer, a warm spring, and an extremely sunny autumn combined with the sculpture show (and a well groomed garden) to produce the great attendance. The highlight of the year was the display of 30 great pieces of sculpture during the month of October within and around the lily ponds between the main gate and the Climatron. The Sculpture Show was sponsored by the Saint Louis Bicentennial Corporation. This was one of the truly great exhibits of art in America, a perfect combination of sculpture and plants, of reflected images, of geometrical contrasts, of color and form rarely seen in any community. Over 70,000 persons witnessed the showing (among other masterpieces) of Rodin's Shadow, Small Shadow, and St. John the Baptist Preaching; Renoir's Large Bather; Henry Moore's Woman on Steps and Standing Figure, and Mother and Child; Maillol's Summer, Venus, Standing Female Figure with Necklace, and Hommage à Debussy; Marcks' Orion and Three Graces; and two remarkable mobiles, Rickey's Five Lines in Parallel Planes and Calder's Five Rudders. To the in-



The Bicentennial Scultpure Exhibition was centered around the water lily pools.
PHOTO COURTESY SHAW CAMERA SHOP

stitutions and individuals who loaned and arranged the pieces, the Garden and the people of Saint Louis are eternally grateful for the privilege they had of this cultural inspiration throughout all of October 1965.

Mr. Mark W. Paddock assumed the position as Administrative Assistant to Dr. Gates on September 1. Mr. Paddock came to the Garden with educational and professional experience in botany, ecology, geography and wildlife management. For almost ten years he has had positions in the University of Colorado's Institute of Arctic and Alpine Research involving research, administration and management. Prior to that he was game biologist with the Idaho Fish and Game Department. Although he has been in the Mountain West since entering the University of Colorado as an undergraduate, Mark is a native of the Midwest. His parents, Mr. and Mrs. Darwin Markley Paddock, still reside in the old family home at Clinton, Iowa, on the banks of the Mississippi River.

The grounds have been especially well maintained this year. James Hampton the superintendent, and his crew, are to be commended for this. The old citrus and alcove greenhouses running west from the display house were repainted and new fibre glass roofs installed. The translucent green of the fibre glass gives them a cool, clean look which is refreshing. The southern half of this structure is to be used for permanent public plantings, and the northern half as an amateur display house. Four new growing houses and a large head house are being constructed to replace the old structure demolished earlier in the year. A parking lot was built behind the greenhouse for the use of those working on amateur displays and at other special events at the garden.

Construction was begun during the autumn, of an office building for the Chief Engineer and Superintendent of Operations, Greenhouse Supervisor, Floriculturist, and other staff. This building is to be known as the Parks Building; its construction was made possible by a bequest from the James J. Park estate.

It is our intention to maintain all parts of the Garden in absolutely first rate order. Towards this end the exterior of the Henry Shaw Town House containing the administrative offices and the herbarium-library building has been painted and reconditioned. Other structures will be similarly treated as the need arises.

Since annual reports were not prepared for 1963 and 1964 it is important to mention some of the major physical improvements to the Garden during those years.

Primarily through the generosity of Leicester B. Faust, the main entrance area of the Garden received a much needed face-lifting in the summer of 1964. New lily ponds, walk-ways and plantings were installed Aside from improving the appearance of this area, the new pools especially will save us scores of hours of maintenance by almost eliminating the need for constant weeding in the pools. Since 1963, a beautiful, large new rose garden has been developed a few hundred feet northwest of Tower Grove House. This rose garden, a gift of Mr. and Mrs. John S. Lehmann, has achieved rapid distinction under the conscientious attention of Mr. Alfred Saxdal, Rose Grower. The St. Louis Garden Club and the St. Louis Herb Society were responsible for the fine development of the fenced garden just to the rear of Tower Grove House. An "Old Fashioned Flower Garden" reminiscent of a gentlemen's garden in the days of Henry Shaw occupies the west half and a wonderfully fragrant herb garden occupies the other half of this area.

## LIBRARY

THE following is a report concerning the status and progress of the library in the words of its librarian, Dr. George B. Van Schaack.

During 1965 the library continued to discharge its duties of acquisition, exchange, binding and circulation more or less normally. But in several respects the year was marked by an upswing in activity, accomplishment and recognition. Beginning the year with only two full-time permanent members, the staff was increased by fifty per cent in July when Dr. Frank Pershe entered upon his appointment as assistant librarian. Dr. Pershe, who in June was granted a degree in library science, has in addition much formal training in forestry in Europe and wide forestry experience both there and in South America. The year's budget for personnel was larger than ever before, and with the extra funds three other positions were filled temporarily on a full- or part-time basis, all relating to the curatorial activities discussed below.

The library was used substantially more than in recent years, as the Garden's program in writing the *Flora of Panama* was stepped up, as the publication of the Garden's scientific journal, the *Annals*, returned to normal size and frequency, and as the researches of new staff members both at the Garden and at Washington University got under way. There was also a noticeable increase in its use by students from universities in neighboring states.

Accomplishment in acquisition was substantial; in addition to the normal influx of hundreds of serial publications which come by exchange or subscription there were purchases of many Russian periodicals to fill gaps in the more than two score titles we currently receive from the Soviet Union, of a full set of the *Bulletin of the Alpine Garden Society*, of several useful bibliographic tools, such as the *Bibliotheca Walleriana*, of facsimile reprints of 19th century reference works as well as of older herbals not in the Garden's large collection of originals, and of one original herbal of 1549. This last is an edition of Dioscorides of particular importance since it contains the only paper by Valerius Cordus published during his brief lifetime; he was one of the major founders of plant taxonomy as it developed in the 16th century. Finally, hundreds of other items were purchased — of smaller value but of much importance to the functions the library serves, chiefly in systematic botany, plant geography and horticulture.

Curatorial accomplishment included the oiling of all the leather bindings in the library — this took a half-time employee some eight months. A full-time temporary employee, during the same eight months, repaired scores of books. Dozens of other volumes were rebound by a Saturday employee who has worked for us for more than two years. Although funds were available for extensive regular binding, the total number of volumes so bound was only 352. Preparation of volumes for binding is a more or less skilled operation — with its present size there is doubtfully enough time for the staff to devote more effort to such preparation.

A most satisfying item on the score of accomplisment was the initiation of a program to repair the library's very old rare volumes. Three of these, dating 1474, 1484 and 1542, were sent to the extra bindery of the R. R. Donnelley & Sons Co. in Chicago where they were restored most expertly and excellently under the direction of Mr. Harold Tribolet. For this type of work it is not easy to find competent craftsmen, nor is it easy to pay the high prices which this repair entails. The three books restored this year all fall into the category of museum material; the volume from 1474, for example, is the second printed edition of an early 14th century work on agriculture by an Italian lawyer and landholder, Piero de Crescenzi — both in its content and in its physical form it is rare, and, in the latter, a beautiful early example of printing. There are dozens of other books, just as precious, which need restoration, and hundreds of others of slightly less 'status' but of no less scientific importance which must be expertly repaired before they can be used. The program has started, but it can continue only if a special fund is maintained!

## HERBARIUM

The outstanding collection of dried plant specimens reached an accession number of 1,808,335 as of 31 August 1965. During the year ending 31 August, 13,335 accessions were added to the herbarium chiefly from North, Middle and South America, Africa and Russia. The dynamic leadership of the herbarium under its new Director, Dr. Walter H. Lewis, is strengthened by the addition to the staff of Dr. Derek Burch as Assistant Botanist. Dr. John D. Dwyer and Dr. André Robyns, Research Associates, continued to work on the *Flora of Panama.* Dr. Dwyer spent the summer in Panama collecting. Dr. André Robyns prepared manuscripts on several families of the *Flora of Panama,* including the Hibiscus family, the Malvaceae, and did laborious checking of several manuscripts submitted by specialists on the subject. Dr. John Ridgway, newly appointed Assistant Professor of Botany at Washington University, was appointed Curator of Bryophytes and Dr. H. Wayne Nichols, Associate Professor of Botany, continues as Curator of Algae. Publications by members of the herbarium staff totaled 23.

The herbarium received a total of 123 registered visitors during the year from Australia, Canada, France, Switzerland and most of the United States. Many of these visitors spent from a few hours to several days studying plants contained within the herbarium. In addition, numerous high school and university student groups were shown the collections.

## FLORA OF PANAMA

Dr. Robert E. Woodson, late Curator of the Herbarium, began the preparation of a Flora of Panama about thirty years ago. Since his death in November, 1963, Dr. Cutler has been in charge of administering the National Science Foundation grant which supports most of this project. In past years about 70 different botanists have contributed the parts of the flora which have been published in the "Annals of the Missouri Botanical Garden".

The new Rose Garden, started in 1963, reached near perfection in 1965.
PHOTO COURTESY SHAW CAMERA SHOP

## ANNUAL SYMPOSIUM

THE 12th Annual Systematics Symposium, again supported by the National Science Foundation, was on the subject, "The contribution of cytogenetics to the determination of phylogenies." The Symposium provides an opportunity for botanists and zoologists to compare ideas on problems of scientific classification. For the past two years the number of participants has been restricted, partly because meeting space is limited, but mainly because intensive interchange of ideas seems to proceed better in a limited group. About 180 biologists attended the meetings last October 15-16. Many of the participants came early or stayed on afterwards to consult the Garden's collections and library and to exchange ideas with our staff.

## TREE AND SHRUB LABELING

A BOTANICAL garden must have its collection of living plants properly labeled. For many years the Men's Garden Clubs of this region have worked with our staff to keep the trees and shrubs clearly and correctly labeled. This year, again, Mr. Arthur Krueger organized a group which replaced or repaired several hundred of the labels on our plants.

## ANNALS

THE following is a brief report concerning the Annals of the Missouri Botanical Garden in the words of its Editor, Dr. Walter H. Lewis.

The highlight of the year was the publication of the Robert E. Woodson, Jr. Memorial Issue as Volume 52, Number 3. This issue contained 27 articles, plus prefatory remarks from the many students, friends and co-workers of the late Dr. Woodson.

The Annals of the Missouri Botanical Garden is a scientific journal in the 52nd year of publication devoted primarily, though not exclusively, to the results of systematic studies of plants. In recent years the journal has published by and large only the systematic results of higher plants and then largely in a restricted region, Panama. This year some progress has been made in expanding the scope to include research papers of more general systematic interest and in the future it is hoped that sufficient funds will allow us to include publication on cryptogamic systematics as well as other research fields. However, the journal should remain as a whole systematic in nature.

Designed as a journal to encompass the research contributions from the botany staff of Washington University as well as the Missouri Botanical Garden, the Annals has been a non-review publication. This year an Editorial Committee was established so that all articles submitted to the Editor could be reviewed and this policy has been consistently followed throughout the year. Whenever the Editorial Committee felt incapable of adequately reviewing an article, the Editor requested reviews elsewhere.

The Editorial Committee consists of the Editor and John D. Dwyer, H. Wayne Nichols, Andre Robyns, and George B. Van Schaack.

## RESEARCH CONCERNING USEFUL PLANTS

DR. Edgar Anderson, Curator of Useful Plants, continued work on several publications when his other obligations to the Garden permitted. Aside from being Editor of the Bulletin, and active in research, Dr. Anderson is continually in demand as a highly accurate, voluminous and willing source of botanical and horticultural information. His active life in botanical gardens for over four decades has prepared him uniquely for this purpose and the Garden's staff as well as outside amateurs and professionals place a considerable burden on Dr. Anderson's time with requests for information. In addition Dr. Anderson gradually took it upon himself to acquaint St. Louis area citizens and its medical profession with the literature on Poisonous Plants. The result was greatly increased interest in plant-poisoning dangers and how to deal with emergencies. Dr. Anderson himself receives numerous calls from anxious parents and hospitals. A mimeographed concordance of all available literature was sent to hospitals, physicians and Garden Staff members likely to be called on plant-poisoning cases.

Dr. Hugh Cutler, Curator of Useful Plants, continued his research on the evolution of cultivated plants, aided by a grant from the National Science Foundation. Most of the work this year was concerned with the history of the gradual development of corn and of the many kinds of squashes and gourds. These plants are especially suited for such studies because there are many related wild plants with which they hybridize and because archaeologists are able to supply dated specimens which record the changes in the plants which have gone on for more than 8,000 years. During the past year about 50 lots of specimens from more than 200 prehistoric sites and from some modern Indian groups were studied and 26 reports sent out. An unusual series of wild squashes collected by an entomologist in Mexico was found to have crossed with cultivated forms. Most of the collections came from the Southwest and from the Mexican and South American highlands and dry areas where conditions permit the preservation of archaeological materials and where most of the wild relatives of New World crop plants grow. A biology student, William Eickmeier, works as a part-time laboratory assistant, and sorts, measures and labels collections as they are received.

A large amount of material has come from the salvage and study operations of archaeologist in the Mississippi Valley. This is being studied by Mr. Leonard Blake, an amatuer archaeologists who has been doing this work in his spare time for the past eight years. Since his retirement early this year, Mr. Blake spends two days a week working on our collections. A joint paper on this work was presented at the annual meeting of the Society for American Archaeology at the University of Illinois in May.

The Garden is one of the very few places which is actively engaged in the study of the history of useful plants. We have frequent visitors who study our collections or request aid in identification or interpretation of their own materials. Dr. Martin Cardenas, from the University of Cochabamba, Bolivia, spent a week at the Garden in August, studying collections of Andean plants with Dr. Cutler.

## FLORAL DISPLAYS

The flower shows during 1965 were superb and Mr. Paul Kohl, Floriculturist, has prepared the following summary of the year's activities.

The annual orchid show opened with a preview for the Friends of the Garden on February 5 and continued through February 28.

Camellias were in full bloom in the Linnaean House during February. Twenty-five new varieties added to the collection in 1964 bloomed for the first time.

The tulip show was scheduled to open March 7 but the opening date was postponed until March 10 to coincide with the three-day Bicentennial Garden Symposium sponsored by the St. Louis Garden Club.

March 27 and 28 the Metropolitan St. Louis African Violet Society used the floral display house for its thirteenth annual African Violet Show.

April 2 Friends of the Garden were invited for a preview of the Spring Flower Show which undoubtedly is one of the most colorful shows of the year. The azaleas, cinerarias, genistas and marguerites dominated the show, but numerous other plants like browallias, calceolarias, felicias, nasturtiums, snapdragons, stocks, daffodils, hycacinths and tulips enhanced the show. For Easter Sunday many lilies were added to the display. The Spring Show continued through April and in early May, Lady Washington pelargoniums were shown.

On May 15 and 16 the St. Louis Horticultural Society held its spring flower show in the display house. This was followed by an exhibit of hydrangeas until June 20. The Rose Show, staged by the Rose Society of Greater St. Louis, had been scheduled for May 22-23 but the show was postponed until May 29-30. Since the hydrangeas occupied the south section of the flower house the rose show was staged at the rear of the hydrangeas. During July and August, caladiums, begonias, fuchias and gloxinias occupied the small formal garden in the flower house.

A one-day gladiolus show, sponsored by the Southwestern Chapter of the Illinois Gladiolus Society, was held in the rear of the flower house on August 1.

From September 4 through September 12 the Henry Shaw Cactus Society staged a cactus and succulent show. September 25-26-27 the Greater St. Louis Dahlia Society held its show and this was as usual a large and colorful display. October 22-23 the Allied Florists exhibited their various bouquet and table decorations.

A preview for the Friends of the Garden opened the annual Chrysanthemum Show on November 5. This show continued through November and then on December 3 another preview for the Friends opened the Poinsettia Display. Poinsettias in pink, red and white dominated the show, but Christmas cherries and peppers, white chrysanthemums, kalenchoes and rosemary plants added variety.

The beds in the main plaza, Henry Shaw's garden at the rear of the residence and the Linnaean garden were planted and maintained throughout the summer. The bedding plants in the main garden were removed after the close of the Sculpture Exhibit on October 31. The beds were then reshaped and planted with five thousand tulip bulbs.

When the old greenhouse range was closed in early May for demolition all plants had to be moved to temporary quarters in the frames and the lean-to greenhouse. Fans and pads were installed at the ends of the house to effect some cooling and in it all of the chrysanthemums and poinsettias were started. The chrysanthemum hanging-baskets and cascades were also grown here. New growing houses are being erected, but these will not be available until sometime next year. In the interval temporary facilities in the tropical greenhouses are being used but for lack of *cool temperature* greenhouses in which to grow the plants this may be a *lean* year for the spring flower show.

## CLIMATRON, EXOTIC RANGES AND AQUATICS

The following report by Ladislas Cutak, Superintendent of Greenhouses concerns the status and progress of the Climatron, Exotic Ranges and Aquatics during the year 1965.

The phenomenal growth of plants in the Climatron remains a source of wonderment to the visitor as well as the employee. This unique structure, though only five years in operation, has achieved maturity in record time. It is amazing how rapidly plants grow when constant warmth, adequate moisture, abundance of light and movement of air, play a contributing part. Throughout the year, heavy to light pruning is carried on. This often becomes a major job for days, particularly when the larger trees are involved.

The average visitor probably does not realize how many species of plants are being grown, and although some die or are removed for various reasons, there are always at least one thousand different kinds on display. New plants are added as they become large enough to transplant. We are searching constantly for plants of ornamental value, plants that are of economic interest, or that play an important role in the lives and legends of primitive as well as civilized peoples. The Climatron is really a 'library' of important living plants.

In July the Superintendent of the Greenhouses, through the kindness of a Board member, made a trip to Hawaii for the express purpose of viewing and studying plants as grown and used in tropical gardens and also to observe how some greenhouse exotics can become naturalized in the ideal Hawaiian climate to the point of becoming weeds. Four of the major islands were visited: Oahu, Kauai, Maui and Hawaii. Seeds and plants were collected, some already growing and others to be shipped from time to time to enhance our collections. The Honolulu Botanic Gardens are playing an important role in this project, but there are also several individuals taking active part.

The jungle lake in the Climatron with the unique Aquatunnel has continued to be a problem even after trying various methods to hold down the growth of algae, mostly on the Plexiglass cover. In December, the major task of removing 70 tons of sand from the pool was undertaken and the pool cleaned. It is hoped that a method will be found to keep the pool free of algae, because this aquatunnel is one of the Climatron's most interesting features.

The two Desert Houses flanking the Climatron received heavy pruning in early January. Many of the succulents like cacti and spurges (euphorbias) reached the glass roof, so with the help of the outside crew this project was acomplished during days of inclement weather. New labels were attached to most of the plants. In the South African Desert House a display of "Brilliant Star" Kalanchoes was a feature for several weeks in the Spring. The brilliant scarlet-red starlike blossoms added color to the scene. The desert is not always a drab place —

in flower it becomes a glorious sight.

The orchid collection under the able management of Mrs. Marion Pfeiffer continues to thrive. Some new hybrids were obtained in exchange and an attempt has been made to maintain flowering plants all year round, particularly for the annual Orchid Show in February, the displays in the Climatron, for the decoration of the Henry Shaw House and the two bouquets furnished the Veiled Prophet Queen in the Fall, and also to take care of emergency decorations at Garden functions.

The water lilies are a great summer attraction in the Garden. In order to assure a good display of flowers, tubers must be planted in heated tanks indoors about January. As they progress, the plantlets are shifted into larger pots and finally set out in boxes in the outdoor pools to develop into magnificent specimens. The outdoor boxes were made ready to receive prepared soil on April 13 and then water was put into the pools ten days later. The actual planting of water lilies was begun on May 4th and within a month the growth response was amazing, which precluded a fine display for the summer. The hybrid Amazon Water Platters outdid themselves again this year and because the year was exceptionally mild, large leaves remained into October. The other Nymphaeas continued to blossom well into November, but finally the last of them were removed and the pools drained on November 22nd. The propagation of the water lilies was entrusted to the care of Mr. Charles Kreher and he did a magnificent job.

## BUILDING, GROUNDS AND OPERATIONS

Mr. James Hampton, a member of the Garden's staff for twenty years, was appointed Superintendent of Operations and Chief Engineer in January 1965. Under his conscientious, tireless supervision, the maintenance, engineering and grounds operations of the Garden have achieved great progress in 1965. The fine appearance of the grounds this year has been mentioned previously, and it is not necessary to go into detail of the year-around effort by an undermaned staff which brought the general outdoor appearance of the Garden to its best level in several decades.

Reconditioning and extensive maintenance of facilities in an organization of this size and nature is always a large job. However, the task is compounded when the buildings are so very old and the equipment often outdated.

## EDUCATIONAL PROGRAMS

One of the most important services provided by the Garden for the Saint Louis region is the educational programs for children and adults in botany, horticulture, and nature. Mr. Kenneth Peck, Instructor, is responsible for these programs and reports on educational activities.

The following statistical breakdown reflects the number of *visits* made by people attending all phases of education programs at the Garden in 1965.

| | |
|---|---|
| Saturday Morning Program for Children | 2,519 |
| Plant Science Program for Grade School Children | 2,889 |
| Tours of Climatron and Grounds by Garden Staff | 2,731 |
| Tours of Climatron and Grounds by Volunteers | 2,651 |
| Pitzman Nature Program for Children | 4,770 |
| Adult Horticulture Courses | 528 |
| Total visits to education programs | 16,088 |

The Saturday Morning Program is beginning its 8th year, having started in December, 1958. The Plant Science Program began modestly in 1959 and has grown steadily from a few hundred children to several thousand annually. This program is a service to the elementary schools in the St. Louis area. Teachers and their classes visit the Garden for lessons in botany. Tours of the Climatron and grounds are given by Garden staff and volunteers. The following volunteers relieved staff for other duties and did a fine job of acquainting groups with the Garden: Mrs. Paul Britt, Mrs. Cecil Criger, Mrs. J. A. Deeble, Mrs. Virginia Hay, Mrs. Emily Horner, Mrs. H. D. Kipling, Mrs. Jos. Lembeck, Mrs. George Pring, Mrs. G. J. Samuelson and Mrs. I. G. Tremain; Messrs. W. C. Berkemeyer, Phil Conrath, Dan O'Gorman, Gil Pennewill and Clifford Rhoads.

A new course for adults in grafting and budding was given in February. This was a one-session course taught by James I. McCaskill. The other courses which have been offered regularly in the past, were given by Clarence Barbre, Raymond Freeborg, Robert Gillespie and Kenneth Peck.

With educational services expanding the way they have recently, the Garden urgently needs new or vastly improved educational facilities. An educational complex containing classrooms, lecture hall, displays, offices and washrooms is another "must" to consider in the near future.

## PITZMAN NATURE PROGRAM — 1965

The past summer was the eighth year for the Pitzman Nature Program for children. It was a busy and successful summer even though

The lure of making their own Christmas wreaths drew over 350 children to the Garden's Saturday morning program last December. Twelve volunteers assisted Ken Peck in the elbow to elbow exercise held in the Experimental Greenhouse.

PHOTO BY MARK PADDOCK

no attendance records were established. Rain was the biggest problem this year as it fell on ten of the forty attendance days. Those acquainted with classroom and auditorium facilities will appreciate the difficulties in getting 130 to 200 children indoors and keeping order. Approximately 80% of the more than 600 youngsters who attended over the summer were eligible for the certificates given those children who completed the program faithfully.

The classes were taught by an enthusiastic group of high school and college young people. Jean and Fred Bardenheier and Veronica Friel, all students at St. Louis University were with us again. Alan Meyers, a student at Princeton University, taught for the first time along with Ann Wynne, a senior at Nerinx Hall in Webster Groves. Robert Crandall, Kevin Friel, and Bill Eickmeier (who has been with the program for three years) served as assistants.

In cooperation with Mr. Earl Hath, President of the St. Louis Audubon Society, it was possible to give another full summer of bird study. Those responsible for organizing study materials and giving the classes on birds were Mrs. Cecil R. Criger and Miss Sarah Owen, both of whom have been extremely faithful this year as in past seasons. Assisting them in teaching were Misses Saundra Dexter and Carolyn Reynolds, Mrs. R. K. Kirkpatrick, Mrs. Catherine Arhos, Robert Guenther, Ray Schlund, and Steve Hanselmann.

Something that is difficult to appreciate about a program like this is that, while it appears to be the same on the surface each year, many changes are made in the course material presented from year to year. One of the new activities this summer was an exercise in mapping. Authentic map symbols were used and the children mapped an area around a lake, locating a dozen or more trees and indicating their positions on the map. A new talk on wilderness survival proved to be of interest even though it suggested that good wilderness foods include grubs, dragonflies, and porcupine livers. Cultures of some of the larger, swimming colonial forms of algae were obtained for observation under the microscope. This sparked a considerable amount of interest, particularly among the younger children. The response to this program over an eight year period has been rewarding. Some of the young people who have been students (and some of them instructors or assistants) are already in colleges and universities preparing for careers in science.

We are, indeed, grateful to Mrs. Pauline Pitzman Eades for consideration in making funds from the Pitzman Charitable Trust available for this program.

## ARBORETUM

WITH a staff of only one full-time assistant plus a part-time laborer, Mr. Frank Steinberg did an admirable job keeping the 1600 acre Arboretum at Gray Summit in good condition. Mowing of the grounds and lawns is the largest single job at the Arboretum, but pruning, spraying, clearing, cutting and routine maintenance of the roads and buildings fill in most of the remaining hours spent by the Arboretum staff. Prinicipal improvements in 1965 include new roofs for the pump room and storage shed, 100 tons of crushed rock for the roads and redecoration of the greenhouse residence which was rented starting in August.

The Arboretum is open to the public every day from 9:00 a.m. to 5:00 p.m. and autos are permitted to drive around the Pinetum Lake throughout the year. Roads beyond that point are open to the public for cars in April and May when the dogwoods, redbuds, and daffodils are in bloom. Of course, walking is permitted on the entire grounds at any time the Arboretum is open and the trails through the wildflower filled "glades" and adjacent woodlands are especially interesting.

Tower Grove House, the country home of Henry Shaw, continued as a popular attraction in 1965. Approximately 30,000 persons visited the historic home. A project of the Historical Committee of the Women's Executive Board, Tower Grove House has received increasing recognition and publicity in the past few years as the citizens of St. Louis became more interested in the history of their city during the Bicentennial celebration

Miss Nell Rives manages the house with the assistance of one paid hostess each day. These hostesses are assisted in turn by two or more volunteer hostess-guides who donate their time. A total of 53 volunteers participated on a regularly scheduled basis in 1965. On December 4 the Historical Committee entertained at a tea honoring the volunteers who gave of their time in 1965.

The Veiled Prophet's Queen of Love and Beauty gave a reception for the school children of Greater St. Louis in the Tower Grove House on October 9. Another special attraction is the annual decoration of the house for the Christmas season. This delightful project is carried on by different committees each year and over 1000 visitors come to see the beautiful Victorian style Christmas decorations.

At the rear of the house are three special, small gardens that have direct relation to Tower Grove House. Two of them, the Herb Garden and the Old Fashioned Flower Garden (see above) have been discussed previously. The Cutting Garden was used for the first time in 1965, after being developed by the Midwest Regional Council of Men's Garden Clubs for the use of Tower Grove House. Twice each week fresh flowers from this cutting garden are made into appropriate arrangements by members of a special committee of volunteers.

## FRIENDS OF THE GARDEN

THE year of 1965 was a very successful one for the Friends of the Garden. Under the able direction of Mrs. Lee I. Niedringhaus, president until May, and Mrs. Edward L. Bakewell, Jr., the current president, the Friends achieved new heights.

The year opened ambitiously with the "My Fair Lady" Première. A large, enthusiastic crowd participated in this special project resulting in a substantial $25,000 contribution to the Missouri Botanical Garden. The friends enjoyed four delightful flower show preview parties during the year and had a special treat on September 30 when a Preview Party accompanied the Bicentennial Sculpture Show opening and the grand opening of the new Garden Gate Shop.

Mrs. Leslie J. Gleason became executive secretary in October, replacing Sally D. Carr, now Mrs. Edwin Cox, III.

We at the Garden appreciate tremendously the memberships in the Friends that have been maintained during the year and welcome all new members. The income from these memberships is extremely important to the operation of the Garden.

An important activity of the Friends is the operation of the Garden Gate Shop for the benefit of the Garden. It was opened in early summer in the south wing of the main gate and replaces two previous shops: a gift shop in the Tower Grove House and a smaller shop in the present location.

Operations of the Garden Gate Shop are under the direction of the president of the Friends and the co-chairmen for the shop, Mrs. John Hayward and Mrs. John Wallace. Mrs. Edwin F. Stuessie is the shop manager. The sales force is comprised of volunteers who spend from one day a month to one day a week of their time helping at the shop.

The Garden Gate Shop has proven to be very popular with visitors to the Garden in its first months of operation. With its bright pleasing appearance, friendly efficient staff and high quality selection it no doubt will continue to attract many through its doors.

## THE FIRST EVENING COURSE FOR 1966

### BUDDING AND GRAFTING

INSTRUCTION, demonstration, and practice of commonly used budding and grafting techniques helpful to the home gardener. The Garden will provide grafting knives, grafting tape, and some plant materials for the practice session. Students are encouraged to bring their own plant material if they care to.

Tuesday Evening, February 22—7:30–10. Instructor: Mr. James I. McCaskill. Museum Building (just inside Cleveland Ave. Gate, 2221 Tower Grove Ave.) Phone TO 5-0440 for further information.

## THE BULLETIN

Dr. Edgar Anderson was editor and principal contributor to the Bulletin of the Missouri Botanical Garden in 1965. Dr. Anderson's ability to make botany interesting and give even the lowest weed a sparkling personality is unsurpassed; we are fortunate that he was able to assume the editorship of the Bulletin in 1963. Dr. Anderson's report for 1965 follows:

As for many years there have been ten issues of the Bulletin, appearing the first part of every month except July and August. There has been a total of 156 pages, thus averaging nearly 16 per number. Eleanor McClure contributed timely horticultural advice for five of the issues, a feature which was widely enjoyed in this area. Mr. Edgar Denison of Kirkwood wrote (and illustrated) a detailed article on how to analyze the comparative values of various fertilizers on the St. Louis market. He demonstrated that there was little correlation between the price charged for the fertilizer and its value in terms of available nitrogen, phosphate, and potash. It was much appreciated by many of the best amateur gardeners in St. Louis, and its sale was actively promoted by members of the Men's Gardening Clubs in the metropolitan area.

The September number introduced a St. Louis historian, Dr. William M. Shankland, to those concerned with the history of Mr. Shaw and his Garden, and he has contributed further interesting details about forgotten or little known phases of the Garden's history which will be published the coming year.

An article "On the Bad Habits of Certain Shade Trees" was appreciated by a number of street tree experts and has been republished in trade and botanical periodicals on both the east and west coast. It dealt with the bad features of several much planted ornamental trees, which if better understood would have more appropriate use in parks, private gardens, and along streets and avenues.

The Bulletin is mailed to Friends of the Garden, it is sent in exchange for various horticultural and botanical publications, and it is subscribed to by various individuals and libraries at $3.50 per year. As of December first the number of each of these were as follows: Friends of the Garden — 3100; Exchanges and Subscriptions — 360.

David M. Gates

## THE LITTLE TREE

There was a little tree
That people like to see.
When people went by
The tree went up high;
But when the people go,
The tree goes down low.
Now the tree is sad,
People come to see him,
—— He is glad.

— Heather Gates
8 years

# WEEDS, BOTANISTS, AND CHEMISTS

I TALKED the other day with a professor of botany who spends a small part of his spare time as a consultant for a firm of chemical manufacturers. Since he has done part of his work in the tropics I thought perhaps they were using him in connection with an extensive or intensive search for ancient herb remedies that might lead to modern drugs. Such work is indeed going forward in this particular company but they have hired my friend for a far simpler purpose; he is teaching them about weeds, what kinds there are, how they are classified, what their common and scientific names are, how to learn to know them accurately. All this is connected with the company's business in weed-killers. Several different efforts are afoot. He is helping to set up, on college campuses, short, intensive training courses for young salesmen. He does a little lecturing and some conferring. The complicated technical control of weeds with modern weed sprays has made it necessary for more key personnel to be accurately informed about weeds than when they were kept down with hoes and cultivators.

There are hundreds of kinds of weed sprays on the market and hundreds of kinds of weeds in fields and gardens. Few weeds behave precisely the same to any one spray; some of them react very differently. Even a junior salesman now profits from technical information about the naming and classification of weeds. When the botany professor first began to describe his efforts for the firm I wondered if their main purpose might not be to have someone like him lined up on their side during the country's bitter disputes about pesticides and herbicides. However, as he went into further detail I realized how perfectly he was filling their very genuine need for a teacher and student of weeds.

All this has led me to reflect a little on the attitudes of human beings towards the weeds they try to kill. A strange, deep connection between killing and loving has been commented on by more than one student of human behavior. Lion hunters, duck hunters, trout fishermen, frequently develop a deep-seated fellow feeling, almost a passionate love, for the animals they pursue. When weeds were controlled by aggressive hand-hoeing, a good many able American farmers took a personal interest in the weeds on their farms. If they met a botanist who could tell them their names and something of their histories they would quiz him at length about points of no conceivable practicality. They would be delighted, for instance, to learn that pineapple-weed *(Mactricaria matracarioides)*, crushed in the fingers, smells like ripe pineapple and is really quite a different plant from the rank-smelling dog-fennel *(Anthemis cotula)* it frequently grows with in American farmyards. (To casual inspection a pineapple-weed looks like a smaller, somewhat aborted plant, of dog-fennel). Can it be that among those who most earnestly develop herbicides a growing interest in weeds for their own sake is already developing emotional overtones?

It has seemed to me for some time that herbicides might lead biologists to a deeper appreciation of the tangled relationships between plants and animals which are closely associated with each other. Had we only suspected what was going to happen when Washington University sprayed its dandelions someone might have recorded the results with scientific precision. For years the University had not had bad lawns, as lawns go in St. Louis, but every spring there had been a magnificent display of dandelions. All children, and a good many adults who were young at heart, had rejoiced in them, and the students chose each year a "Dandelion Queen." The remnant seed stalks, however, tended to look pretty messy at Commencement time.

As soon as herbicides came on the market, the lawns were intensively sprayed. The dandelions almost disappeared but the grass, in parts of the campus, was more inferior as turf. Between the Quadrangle and the Chapel there were more little bare spots than in former years and there was a conspicuous increase in chickweed. This had not been one of the areas where the dandelions made a really beautiful display. It had been largely a mixture of thin grass and struggling dandelions but there had never been enough chickweed to notice. Now it was conspicuous and became unsightly as it slowly died off with the approach of really hot weather. The dandelions apparently had been helping to keep it in check and now most of them were eliminated. For several years the chickweed continued to be a matter for general comment but no one thought of electing a chickweed queen. Then new construction in this part of the campus brought graver problems for the turf. Chickweed continues but the struggle for existence in the lawn has entered a new phase. From the increasing number of inquiries the Garden receives each spring about controlling chickweed in the St. Louis area, one might suspect this is a general problem.

EDGAR ANDERSON

## IN MEMORIAM MARGUERITE URBAN KRUEGER

OF ALL the volunteers who have served the Garden in so many ways none helped us more and bothered us less (asking nothing in return) than Mrs. Arthur J. Krueger. Behind her considerate friendliness was a brilliant college-trained mind and a vast common sense. Those who worked the closest with her appreciated her quiet way of relieving tensions with a few dryly humorous phrases when groups of various kinds worked together on a complicated project. Some of us on the Garden staff delighted in the way she, to the very end of her life, kept a sharp eye out for plants which were new to her, whether they were garden flowers, forest trees, weeds, or wild flowers. She died peacefully in her sleep, after a few days of illness, on January 9.

# PROGRAM OF SATURDAY ACTIVITIES FOR 1966

*JANUARY*

1 Holiday. (No program will be held.)
8 "Winter Puzzles." Children will identify trees in winter by their twigs.
15 "Jungle Plants." A short trip through Climatron to learn about and view jungle plants.
22 "Life Secret of a Plant." Microscopes will be used to view plant cells.
29 "Table Top Greenhouses." Propagate plants from cuttings. (Bring a 1 lb. coffee container and plastic bag large enough to cover.)

*FEBRUARY*

5 "The North Woods." A slide-illustrated discussion on the forests in northern Michigan and Wisconsin.
12 "Mystery of the Orchid." Why is it different from all other flowers?
19 "Nature Movies." Three color-sound nature movie films.
26 "Pin Cushion Forests." Life story of mosses. Take home labeled specimens.

*MARCH*

5 "The Story of Ferns." Comparison of ferns to mosses and flowering plants. Press fern leaves to take home.
12 "Plants in a Capsule." Seed structure and how they are formed. Take home seeds.
19 "Miniature Gardens." Plant little gardens to take home. (Bring rigid container, maximum size 10″ × 10″ × 3″ deep.)
26 "Sowing Seeds." Learn to sow seeds. (Bring 1 lb. coffee container.)

*APRIL*

2 "Rise of Forests." Plant succession or how forests come into being.
9 "Nature Films." New color-sound movie films on a spring theme.
16 "Flower Shapes and Names." How to identify spring wild flowers.
23 "Transplanting Seedlings." Transplant and take home plants for a small garden. (Bring a 1 lb. coffee container.)
30 "The Bread-Winning Family." Collect and mount grasses to take home.

*MAY*

7 "Nature Hunt." A treasure hunt for leaves and seeds. Prizes awarded.
14 "The Mighty Oaks." Make collections of important species to take home.
21 "From Dust to Seed." Flower pollination and development of fruits and seeds.
28 "Dangerous Plants." Learn to identify poison ivy and other poisonous plants.

*JUNE*

4 "The Queen of Flowers." Sample and study the fruits of members of Rose family.
11 "Uses of Wild Plants." Learn way to use wild plants as source of water, food and dye.

*SEPTEMBER*

17 "Table Top Greenhouses." Propagate plants from cuttings. (Bring 1 lb. coffee container and plastic bag large enough to cover.)
24 "Little Round Green Things, and Others." The story of Algae in puddles and lakes.

*OCTOBER*

1 "How to Make a Terrarium." Small plants and soil for a terrarium supplied by Garden. (Bring a wide mouth jar or small glass bowl.)
8 "Planting Bulbs." Paperwhite narcissus bulbs planted to take home. (Bring a 1 lb. coffee container.)
15 "Fall Colors." Draw or paint scenes in Fall color.
22 "Fall Treasure Hunt." Field trip in Garden. Contest and prizes for solving riddles and trail finding.
29 "The Forests of the Rocky Mountains." A travelogue illustrated with slides.

*NOVEMBER*

5 "Bird Feeders." Make a simple bird feeder to take home. (Bring an empty half-gallon milk carton.)
12 "Fun with Fruit." Learn to identify variety of fruits. Prizes awarded.
19 "Deserts." The deserts of North America and how plants live in them.
26 "Winter Window Vegetable Gardens." Children will plant seeds and plants of vegetables to take home. Bring rigid container 10″ × 10″ × 3″ deep.

*DECEMBER*

3 "Insectivorous Plants." Demonstration and description of weird plants that digest insects.
10 "Making Christmas Cards." The Garden will provide Christmas scenes on cards to be colored by the children in water color or crayon.
17 "Christmas Wreaths." Make a Christmas wreath to take home. (Bring a wire coat-hanger.)
24 Christmas Eve. There will be no program. Merry Christmas!
31 "Nature Movies." Three color-sound movie films.

For children from 7 to 16 years old. Meet at the Museum Building (just inside the Cleveland Avenue Gate) and nearby greenhouses from 10 to 11:30 A. M. Free. No advance registration required. For further information phone TO 5-0440, Mondays through Fridays 9 to 5.

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Owen J. Sexton, Research Ecologist

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George B. Van Schaack, Librarian and Curator of Grasses

The Missouri Botanical Garden is a fund member of the Greater St. Louis Fund for Arts and Education.

Several scientists and their students talking things over during the 12th Annual Symposium on Systematics, October 16, 1965.

PHOTO COURTESY OF ELLEN LISSANT AND SHAW CAMERA SHOP

ONE of the Garden's activities with which Henry Shaw would most certainly be pleased is the annual Systematic Symposium for teachers and students of plant and animal classification. It was started informally in October, 1954, by six members of the Garden staff. Their wives pitched in, to keep down expenses and produced baked ham, potato salad, coffee and cake, creating an informal, friendly atmosphere which has persisted through the years. Beginning with 1955 the Symposium has been supported by annual grants from the National Science Foundation and has been held here each year on an autumn weekend. Eventually it has had to be limited to a hundred and seventy visitors, the number best dealt with by our facilities. The informal atmosphere and the Garden background have made it outstanding among scientific conferences in its vigorous interchange of ideas and information.

A Friday evening Smoker and morning and afternoon sessions are centered in Henry Shaw's quaint old Museum. Mrs. Lissant's snapshot catches a few of last fall's participants in earnest discussion as they are just getting back for the afternoon program after lunch in the Floral Display House and a visit to the Climatron.

An increasing number of these visitors combine the formal sessions with consultations in the integrated Library and Herbarium founded by Henry Shaw. These professional errands take from half an hour to several days so that the Library and Herbarium staff have all the visitors they can readily accommodate for about a full week.

The informality, the beauty of the Garden in its fall coloring and the mingling of everyone from world-famous scientists to college freshmen make it an effective and pleasant occasion for the participants and the Garden. For over a decade it has been quietly diffusing throughout University and Museum centers a deep appreciation of the Garden's remarkable assets and a sympathetic concern for its welfare.

# MISSOURI BOTANICAL GARDEN

# Bulletin

February 1966
Volume LIV
Number 2

COVER: The lower branches of a mature Golden Larch in dappled sun and shade. The figure on Page Seven indicates the scale.

PHOTO: BRIAN GORDON

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Missouri Botanical Garden Bulletin

Vol. LIV No. 2 February 1966

# THE OPEN SPACE COUNCIL FOR THE ST. LOUIS REGION

"WOE unto them that join house to house, that lay field to field, till there be no room"—no room for gardens, for trees, birds, flowers, and parks—for wandering and wondering.

When Isaiah bewailed congestion, most people lived on the land. Today more and more of us are crowding into urban areas which obliterate the natural landscape as they sprawl over the countryside. Land is destroyed, air and water polluted, natural beauty ravished. Man lives in inhuman urban ghettos, tense and nervous or bored and indifferent, ever farther from open land and the solace of nature.

And what of our own home? Cradled in the Ozarks and washed by great rivers, St. Louis, the gateway to the west, is gateway to a frontier that is no more.

But we are fortunate. Along the rivers and in our rough hills we do have left to us some bits and pieces of wild land, land which can soothe and heal, instruct and inspire. If we do not seize these green islands at once, they will vanish under the bulldozer, and our children will joggle in metal boxes for hours to reach their like.

Recognizing that a pleasant natural environment within an hour's drive of the central city is being rapidly and irretrievably lost, the Open Space Council for the St. Louis Region has been formed to initiate and support efforts to:

Set aside sufficient lands and waters for parks, forest preserves, and recreation purposes;

Control destructive urban development of open country unsuitable for such development;

Protect our natural resources from pollution; and

Support appropriate zoning, and land management that recognizes recreational values.

The Open Space Council has already identified a number of areas in the St. Louis region which should be preserved in their natural state, and others, like the lower Meramec, which should be developed for intensive recreational use. We are working toward their protection and acquisition.

Believing each Friend of the Garden to be a friend of ours, we would welcome your support and participation in our program. Regular membership is $10, supporting $25. Inquiries should go to Membership Vice-Chairman Mrs. Jay G. Rice, 240 Blackmer Place, WO 1-0895, and checks payable to the Open Space Council to our Treasurer, Mr. Byron Schubel, Hillsboro, Missouri.

We thank the Missouri Botanical Garden for the opportunity to tell you a little of our progress. With your active assistance we can reach our goals.

LEO A. DREY, President

## FRIENDS OF THE GARDEN TRIBUTE FUND

ABOUT a year ago the Women's Executive Committee of the Friends of the Garden made active efforts to remind all Friends of the Tribute Fund as an appropriate memorial for those who had kindred interests with those of us at the Garden. It was certainly a new idea to a few members for when they received the little folder they promptly sent it back with their dues for the year.

However, the custom is catching on; since the first of September we have received the following memorial contributions:

Mr. & Mrs. Joseph H. Pollack
in Memory of Mina Berger

Mrs. Harry F. Langenberg
in Memory of Drew Brown

The Carr Family
in Memory of Frederick Cornwell

Sowing Circle Garden Club
in Memory of H. Dawson

Mrs. Henry F. Langenberg
in Memory of
Mrs. E. M. Durham, Jr.

The Podmaniczkys
in Memory of Sherry Erker

Mrs. Elizabeth Oliver
in Memory of C. A. Fitzgerald

Mr. and Mrs. G. S. Rosborough, Jr.
in Memory of
Florence Harms Grace

Forsythia Garden Club
in Memory of Mrs. Roy Hansen

Mr. & Mrs. Ham Grigg
in Memory of W. MacLean Johnson

Mrs. Mae H. Mandel
in Memory of Theodore Lending

Mrs. Barbara H. Lincoln
in Memory of I. Powell Morton

Mr. & Mrs. George Fencil
in Memory of Derby S. Snow

Mathilda Schwink
in Memory of Margaret E. Wippo

Monsanto Chemical Co. Employees
in Memory of Mrs. Rose Zienty

Mr. & Mrs. William Lakamp
in Memory of Mrs. Rose Zienty

Mrs. Edna Gellhorn and
Mr. & Mrs. Wm. Carson
in Memory of Walter S. Haase

To make such a memorial contribution, simply forward a check made payable to "Friends of the Garden Tribute Fund" and mail it to 2315 Tower Grove Avenue, St. Louis, Missouri 63110. The Friends' Office will send an appropriate card to the family of the deceased.

# THE GOLDEN LARCH, *PSEUDOLARIX AMABILIS*

HORTICULTURALLY, the golden larch, though known to comparitively few of our gardeners, is one of the peculiar treasures of the St. Louis area. Ever since it was discovered in China in 1853, discriminating collectors have been trying to get hold of likely young specimens for their collections. In a Kirkwood garden there are four old trees which have been seeding themselves in the neighborhood for several decades. As these seedlings have become increasingly known and cherished, they have been spread to other gardens, including the Missouri Botanical Garden. The group of them increases not only garden beauty in our whole community but can furnish a back-log of information about a species which in the Occident is still too little known and too incompletely understood. Rehder, for instance, following English authorities, includes in his technical description of the golden larch the flat statement, "it dislikes limestone soil." The Kirkwood trees are growing and seeding themselves above limestone on a hillside where the soil is not deep. There are evidently points still to be worked out about the golden larch's tolerance of lime.

The golden larch is not just another larch, though like that tree it is exceptional among cone-bearers in shedding its leaves in the autumn and going through the winter with bare branches. It is in a genus by itself. Though it is known as a fossil there are no other living species. Its needles are much larger than those of a true larch. They are 2 inches long, up to an eighth of an inch wide and so flat that it seems inappropriate to call them "needles" and one reverts to saying "leaves," which would of course be perfectly correct. The size, number, and arrangement of the leaves give the branches a feathery appearance. Trees up to twenty-five years old or so have more the habit of a cedar of Lebanon than of a larch, particularly when seen from a hundred feet away. The differences are not just superficial; the more one digs into technicalities the more unique is the golden larch. The stamens are borne on special little leafless spurs, the cones come to pieces when they are ripe just as do those of the true firs, and the pollen when seen under the microscope has wings at either end, not like that of larches but of the pines. The cones are larger than those of the true larches. They can be up to three inches long and two inches wide. In midsummer before they ripen and turn brown they are a clear celadon green and with their reflexed scales have the look of little roses made out of smooth green leather.

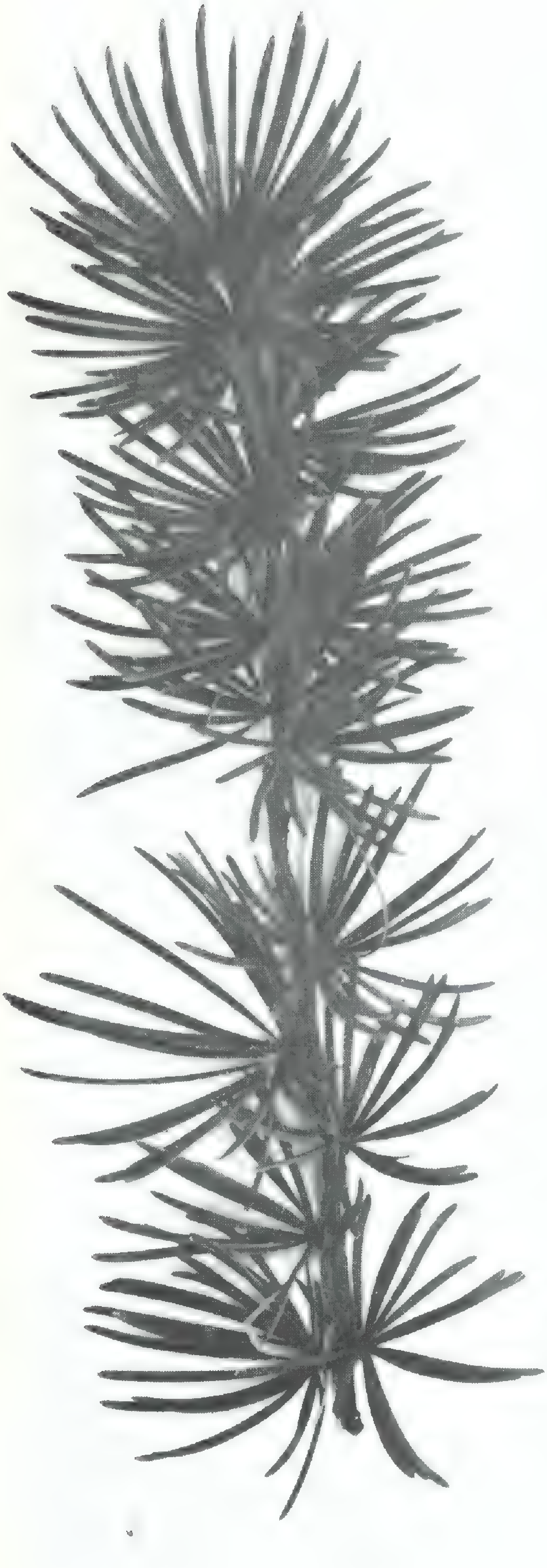
The foliage of the golden larch, when conditions are just right, can develop so regularly, and so much in one plane, even over a large portion of a branch, that it gives the appearance of pattern weaving or of tapestry. The basic elements in the design are the short shoots and the long shoots. The latter form the framework of the branches; the former produce the spurs, slender branchlets set at fairly regular intervals all along the branches. Each spur is terminated by the short shoot of the current year. During the growing season this will be a flattish rosette, three or four inches across, of around thirty leaves arching gracefully towards the neighboring rosettes. For year after year the spurs bear nothing but short shoots. Each year's growth adds one little rounded dark bump to the spur. These little branches do not increase in diameter perceptibly. When examined closely they look like tiny dark wooden beads, jammed closely together on a gently curving wire. Even after ten or twenty years, however, they maintain their separate identities; one can count the "beads" and learn just how many years that particular spur has been growing.

By contrast with the short shoots on the spurs, the long shoots which are laying down the main framework of the trunk and branches are a little sloppy looking seen close at hand. Farther away they become a feathery green plume and add to the decorative aspect of the tree. In late spring they are vigorous green shoots with a scattered irregular spiral of arching flat green needles at the base, passing into a more clustered zone at the still-elongating tip. By late summer the twig has become a light red-brown. It already looks woody but has a waxy, sometimes almost violet overcast. The needles become closer together towards the apex and there is a final circle of them close together just below the terminal bud. They stand out away from the twig and at different angles. With a little patience one can make out that there is more regularity in their attitudes than there seems to be. Those which arise from the underside of the twig point forwards; those from above tend to arch upwards and outwards. All along the twig at the base of some of the needles are the scaly little buds which will open out next spring into short shoots or, much more rarely, a long shoot about to start a side branch.

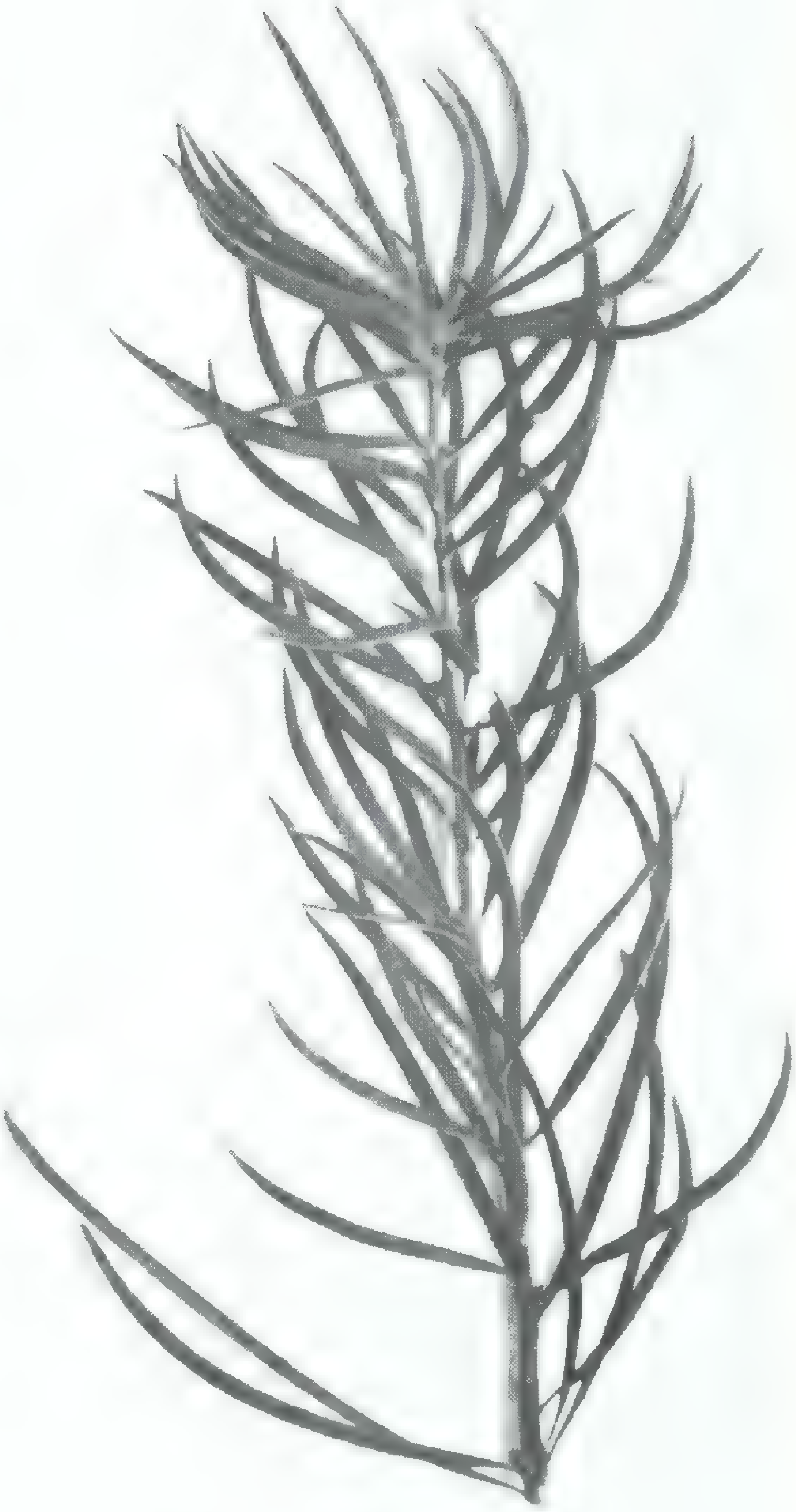
The golden larch was discovered in south-eastern China in 1853 by the great English plant explorer, Robert Fortune. He was out in China for some years as the representative of the Royal Horticultural Society, collecting seeds, bulbs, potting up seedlings, rooting cuttings (as for instance the first Forsythias to arrive in Europe). All these were sent back through the mails or in sealed, glass-sided Wardian cases, lashed to the masts of sailing ships, up out of the reach of damaging salt spray.

He found the golden larch growing wild in Chekiang and Kiangsu, significantly in that part of China for which Dr. Li has recently presented convincing evidence as the original home of the Ginkgo. He had already met the golden larch in cultivation being grown as a *bonzai* in a large pot and trained to look like an ancient Cedar of Lebanon.

Robert Fortune made extraordinary efforts to introduce the golden larch into Europe. After he got back to England he published a detailed summary of his Chinese introductions on February 25, 1860, in *The Gardener's Chronicle and Agricultural Gazette* (as this distinguished old journal was known in those days). He warned his



A two year old twig bearing 15 short shoots.



A long shoot at the end of the first season. See pages 3–4.

PHOTO, COURTESY SHAW CAMERA SHOP

readers that the golden larch would be difficult to get: "It will be very rare in Europe for many years to come, owing to the difficulty of getting seeds to germinate after the long voyage. Knowing the importance of a tree of this kind, and that it was almost impossible to propagate it in this country, I used every means in my power to introduce its seeds in large quantities and in good condition. They were sent by the overland mail—some in letters through the Post Office, and others in small packages—for several years in succession, and were often sown in England in less than two months from the time they were gathered from the trees in China. Out of all sent home only one despatch [*sic*] vegetated freely, all the others were complete failures. All the plants of any size now in England were dug up in the woods of China and sent home in Wardian cases."

Though good plants of it reached England it has never done so well there as in the eastern United States and in northern Italy. The English summers are apparently too cool for its best development. There was for some years a remarkable tree at Pallanza, a small resort town on Lago Maggiore in north Italy. It was situated on a small tongue of land running out into the lake, the warmest and most sheltered spot in the vicinity.

The first tree in the United States was brought over to the Parson's nursery in Flushing, Long Island (now a part of Greater New York). It was imported in 1859, apparently from a sale of Fortune introductions, as a small tree three feet high. When seen by Professor Sargent in 1895 it was still surviving near the famous Weeping Beech. The latter (for some decades at least) survived in a small park all its own, so presumably this golden larch disappeared early in the twentieth century.

An outstanding American specimen of golden larch also fruited and seeded on the shores of a small lake. The Hunnewell family of Wellesley, Massachusetts, maintained a choice arboretum at their estate on Lake Waban. It bore fertile cones in 1893 and seedlings which came up near the tree were the source of specimens in other American collections.

A tree at the Arnold Arboretum in Boston fruited for some years but the seeds were sterile or practically so. About 1932, noticing that a smaller tree nearby had reached fruiting age, I persuaded the late Mr. William Judd, a very skillful propagator, to make another trial. It seemed that if inbreeding had anything to do with the sterility, there was now an opportunity for cross pollination. To our delight the seeds germinated so well that they looked like a coating of ground pine in the propagating flats. A fine lot of young seedlings were raised from them and were widely distributed.

Since that time the Arnold Arboretum trees have continued to have fruitful years, though for a time the dust from nearby quarries was hindering the trees. In response to a request for information about their seed and its fertility, Mr. Alfred J. Fordham, the Propagator of the Arnold Arboretum recently wrote me as follows:

"I have been observing the fruiting habits of *Pseudolarix amabilis* quite carefully each year for the past six years and have noticed that on alternate years we have had heavy crops of viable seeds. However, this year is the off year but a few cones have been produced on one tree; they are quite scattered and are not producing in the usual manner with great numbers on certain branches. We also have germinated this a number of times in recent years with very good success. I have not worked with counted numbers but do know that the percentage is very high. Our best success with this subject has been to provide it with two months of cold stratification after which a general germination occurs very quickly.

"Another point is that the few scattered cones that have been produced this year are almost devoid of viable seeds. I checked three cones yesterday and found only three sound seeds. Our specimens of 'Golden Larch' at the Arboretum are now in superb condition. The dust from the quarries is no longer a problem as they no longer exist. I assume there has been an opportunity for cross pollination here at the Arboretum but have not checked this carefully. I have noticed the conelets at pollen time, both male and female, but have not checked to see whether or not the same condition prevailed on all trees."

One of the reasons the golden larch is not better known in the United States is because for several decades it has been at least somewhat confused in the trade with the much commoner and much more ordinary Japanese larch *(Larix leptolepis)*. It was natural that this confusion should have come about. The Japanese larch was once commonly known as *Larix kaempferi, t*he golden larch as *Pseudolarix kaempferi* as well as *Larix amabilis*. When I was on the staff of the Arnold Arboretum I visited two or three collections of fine trees in which were proudly exhibited specimens of a "golden larch" that turned out to be merely the Japanese Larch. A few years later in one of the best nurseries in the United States I was shown a whole row of young Japanese Larches which were being sent out as "golden larches." Quite recently Mr. Clarence Barbre of Webster Groves bought seeds of golden larch from a reliable firm which proved to be a species of *Larix* when they came up. I have no

Lower branches of a golden larch with a hand to show the scale. Twigs near the hand are bearing only short shoots. Below the hand four long shoots branch out near the base of the figure. PHOTO, BRIAN GORDON.

means of knowing how general this confusion may be.

The Kirkwood colony of golden larches apparently traces back about fifty years by the size of the four oldest trees. They are all on land which was part of the old John Curlee estate on Sappington Road in Kirkwood, Missouri. As I found out more and more about these trees I became increasingly puzzled as to how several rare trees could have made their way out to Sappington Road in the early nineteen hundreds. In those days few Americans knew about *Pseudolarix*, but a number of eastern aristocrats were pulling wires to get hold of healthy seedlings for their collections; I have never heard of anyone who secured a whole group of them.

The John Curlees, I was told, had all died or moved away but through an old friend of the family I was put in touch with a daughter of John Curlee who is married and living in Greater St. Louis. She remembered the trees at once and said they were already on the place when her family moved there when she was a young girl. She immediately had a good suggestion as to how they probably got there. John Curlee acquired the estate from John Blair, who in addition to some fine native oaks had planted such unusual trees as the Bald Cypress and taken good care of them. Mrs. James Blair had been most successful as the official hostess for the St. Louis World's Fair in 1904. When the Fair was finally over and the exhibits were dispersed, she was given many choice things by the friends she had made among the exhibitors. The golden larches might well have been acquired by the Blairs in this way.

To me this seems almost certain. In 1904, before the days of Horticultural Quarantines, foreign nurserymen came over bag and baggage for the Fair and brought in quantities of exotic material. We know that tubbed specimens of young golden larches had been available in China before that time. Well cared-for young specimens of golden larch would be just the thing for part of an oriental garden or background for an oriental restaurant. What could have been more likely? So far as I can see they might well have been brought over either from Japan or from China.

Today the four largest (and apparently oldest) trees are growing towards the top of the gentle, undulating north slope on which the various seedlings are to be found. This immediate area is no longer a very desirable site for choice conifers, though the four old golden larches are standing it remarkably well. Immediately to the north of them "Sappington Spur," an entrance drive to part of the old Curlee property, has been cut into the side hill just below the trees; it must certainly have affected their water supply. Immediately on their southern flank is the private entrance to what was once the Curlee home, a large, dignified, squarish mansion. Bordering them on the east is a small garage. Between it and the boundary fence along Sappington Spur (almost immediately under the northernmost tree, though well screened from public view) is a pile of brick and other rubble.

The Blair trees from which the Sappington Golden Larches originated.

The four trees vary in diameter at breast height from about fifteen to twenty inches. It is apparently the northernmost of these trees which has been the most prolific source of seed. In the best seed year seedlings came up thickly among the bricks and rubble, where they were nicely shaded. Two years ago, in spite of an early summer drought, one young seedling was still to be found there in early September.

Several hundred feet down the slope, between Sappington Road and the first house on the Spur, is the next largest of the trees. It is smaller in diameter and less mature in form than those at the top of the slope, though apparently growing in a more advantageous situation. It has fruited at least once and might be either the oldest of the seedlings or one of the original trees set out by the Blairs. Everything considered it is more probably a seedling; golden larches, given good growing conditions, can increase in height very rapidly.

News of these interesting trees began to spread in horticultural circles in St. Louis in 1945 when the James McClure family moved into their home on Sappington Spur. Mrs. McClure wore a small specimen to the Garden as a corsage. It was identified and the trees were then appreciated for their rarity as well as their beauty. The McClures, and other families in the neighborhood, have treasured the seedlings and protected them from rabbits. There are now about twenty to thirty trees of various sizes on the hillside; some of them have come up as far as three hundred yards down the hill. Quite a number of young trees have been passed on to other gardens in the St. Louis area. Gradually quite a fund of knowledge about them has been accumulated. Apparently one of the difficulties of growing these trees in the Occident has been that aside from Fortune's original transplants, we have been dealing with an inbred group. The Sappington golden larches have evidently been cross-pollinated. They have naturalized themselves vigorously for an exotic conifer in Missouri. They have apparently fruited a little every year, though more heavily some years than others and very heavily indeed in one year (about 1946). It has long been known that the seedlings require shade; Fortune wrote pungently about how *not* to treat them a century ago: "Nothing can be worse for small plants of this kind, in small pots, to be alternately baked in the sun and deluged with water." The Sappington golden larches in addition to cross-bred vigor have had adequate shade. The gentle north slope and the protection of other trees must have been helpful, particularly in drought years when hot dry winds out of the Southwest can blow for a week at a time. In September of 1963, after quite severe drought, particularly in the early summer, it was evident that shade, even after the seedling stage was passed, had been beneficial.

On this hillside, when protected from wild rabbits, they have done amazingly well. One, for instance, was in a nursery bed in which propagation under constant mist was being carried on for three years. The soil became so water-logged that two young oaks were killed but the golden larch grew so vigorously that it had to have its side branches pruned back to keep it out of the way of the other choice plant material. Another young tree had its leader blown out when it was about 10 feet high. It recovered so quickly that it is now difficult to find the point at which a side branch took over, even after the tree has been pointed out. One seedling was bitten back to the base by rabbits but it sprouted up again and grew into a vigorous plant.

Two of the Sappington trees were

presented to the Garden by the Federated Garden Clubs in 1953. Choice plant material was set out and the area was dedicated on May 22nd. The golden larches have grown well. They are now about 20 and 30 feet high and every year become of more interest to visitors. Their beautiful lower branches have been somewhat damaged by children running through the Garden, grabbing branches as they run, an ever-increasing problem both inside the Climatron and out-of-doors.

Trees in the background have provided shade, particularly for the larger specimen, and the Museum Building itself has helped to break the force of hot southwest winds. Neither tree has shown any winter injury.

The only serious problem with these golden larches in St. Louis has been needle blight. In the last five years this has become increasingly common on bald cypresses (Taxodium), the true Cedars (Cedrus), the dawn-redwoods (Metasequoia) and the golden larch (Pseudolarix). All of these when uninfected have particularly attractive foliage which seems to be more susceptible then the harsh needles of the other conifers. With small specimens this can be controlled by spraying with Zineb, a process which becomes more difficult and expensive with large trees. The golden larches at the Garden for the last two years were unaffected. Both at the Garden and in the Sappington area it has been apparent that golden larch trees which are moderately shaded by nearby but not overhanging trees are less effected than those with more sunshine.

The discoloration made by the leaf spot organism, though certainly not beneficial to the tree, is rather natural looking and reminiscent of the autumn coloration. This is handsome but fleeting. For a very few days the leaves turn from green to gold, then quickly fade to red brown as they begin to fall. They are in truth, "Golden Larches," for only a few days a year. On the specimens at the Garden some of these red brown leaves linger longer than the others and year after year become more attractive in the autumn landscape. In the original Chinese forests where many trees were involved the mingling of green and gold and redbrown may have been much more spectacular.

Edgar Anderson

## HEAD START FOR SPRING SEEDLINGS

By ELEANOR B. McCLURE

One of the pleasantest of winter pastimes is starting seedlings in the house. And it can be a profitable project as well, for you can select seeds of the latest flower introductions and choose hybrid vegetable varieties that have built-in disease resistance. Furthermore, your home-grown seedlings can be moved into the garden at the most propitious time and with a minimum of shock. As a result, they can benefit from the fine growing weather that so often comes in very early spring.

However, if your Project "Head Start" is to be a genuine success, you should exercise care and restraint, in about equal parts. Carried away by pre-spring enthusiasm (and those bright pictures in the catalogue), you may be tempted to start too soon, sow too many seeds, and plant too thickly.

These difficulties can be avoided if you limit early seed sowing to just a few varieties and plant just enough to produce the approximate number of plants actually needed in your garden.

When selecting seed, give preference to slow-growing flowers that really need a head start. Among annuals that may be planted now are salvia, verbenas, petunias, snapdragons, annual hollyhocks and asters. Fibrous begonias and bedding dahliahs may be grown from seed, as well as perennials like dianthus, gypsophila, coreopsis, shasta daisies, and various kinds of columbines. One of the best ways to get a start of delphiniums is to sow seeds in early spring.

Seeds of onions and Chinese cabbage need an early start, but sweet peppers and tomatoes should not be planted before March 15. Tomatoes that are started too soon are apt to become lanky, anemic-looking weaklings.

Many of the hoary old theories about transplanting have been disproved. We now know that digging and resetting seedlings does not "promote strong root growth." On the contrary, each move can bring a setback. Tomatoes, for example, will produce earlier and heavier crops when their growth has not been checked at any point between germination and fruiting.

Transplanting shock can be practically eliminated if you start your seeds in the convenient little peat pots. An easy way is to plant just two or three seeds in each pot. The weakest ones can be weeded out after germination, leaving the strongest seedling. The peat seems to stimulate the roots, so that they make a very dense and fibrous growth. As a result, the plants can be handled with ease, even after the pots have partly disintegrated. At planting time the seedling, pot and all can go right into the ground.

As an aid to germination, either perlite or sphagnum peat can be substituted for dirt. The perlite can be purchased in large bags from any firm that sells building supplies. The small white granules (which are an expanded lava) are superior to sand, for they provide a very light and airy medium. Unlike vermiculite, the perlite never becomes soggy or compacted.

Sphagnum moss, which can be obtained from a florist, should be rubbed through a screen made of fine-mesh hardware cloth. Like perlite, the moss provides fine aeration and excellent drainage, thus encouraging rapid and sturdy root growth. Moreover, seedlings grown in these inert and nearly sterile materials are not subjected to damping off and other soil-borne diseases. There will be no packing or crusting of the surface, nor excessive washing when pots are watered.

The pots should be filled to the top with the moss or perlite and then tapped lightly, to make it settle a bit. Large seeds may germinate better with a light covering. Very small seeds, like petunias, can be scattered thinly on the surface. As the plantlets develop, the sturdiest ones can be lifted with very little disturbance to their roots. They may be replanted in a pot or tray that will afford ample elbow room.

When started in either perlite or sphagnum, seedlings should be fed once or twice a week with a weak fertilizer solution—half strength Rapid-Gro, for example. This will give them a well-balanced ration. Another good system is to partly fill pots or flats with garden loam, leaving room for an inch of perlite or sphagnum on top. The seeds then germinate readily, but as the roots develop they can penetrate into the soil to find an ample food supply.

These materials—peat pots, trays, growing medium, and packets of soluble fertilizer—may be purchased in handy seed-starter kits that are now widely available. Some kits will have small heating cables that can be used beneath the pots, thus speeding germination and growth. Most helpful of all, perhaps, are "grow lights" to overcome the biggest handicap of the window sill garden: insufficient illumination.

Even when grown in a sunny south window, seedlings tend to bend toward the light, and then look thin and leggy compared with the sturdy plants grown in a greenhouse. This condition can be corrected by adding an ordinary incandescent bulb, supported by three wire legs and provided with a shade to direct the light to the proper spots. Natural daylight can thus be balanced, so that plants won't have to keep turning toward the window.

For a larger seedling population there are fluorescent grow lamps that are like the ones used for African violets. Beneath these strong lights the seedlings can be grown in close to greenhouse conditions. This means, too, that they may be grown in any spare room, or even in the darkest corner of the basement. The enthusiastic hobbyist can make a fairly permanent installation, with batteries of lights installed above shelves or tables. One portable unit, which is sold at a St. Louis nursery, has a sturdy metal frame about five feet tall, supporting three wide shelves. Each shelf has its own light unit.

The lights may be turned on and off automatically by an electric timer, much like the ones used in henhouses. A good schedule: lights on at 7 a. m., off at 11 p. m. Very small seedlings need high light intensity and should be brought to within two or three inches of the lights. This can be done by placing them on a small carton, a wooden box, or a platform made of stacked-up bricks.

Whether grown in pots or flats, or windowsills or beneath lights, the seedlings will appreciate higher humidity than is found in the average home. One way of increasing humidity: place the pots or flats on large trays or pans covered with gravel. Water should then be poured into the trays and kept at a low level, so that the containers do not actually stand in the water.

Small trays or flats of plants can be given nearly greenhouse humidity if they are kept inside a turkey-sized plastic refrigerator bag. A section of plastic sheeting or shower curtain can be used to increase the humidity for plants growing on shelves beneath fluorescent lights.

Seedlings are ordinarily grown for only a few weeks in these plant "incubators." It may be necessary to find roomier quarters for some on a glassed-in porch. Sometimes it is possible to enclose basement window wells with plastic to make small greenhouses.

Most cold-tolerant plants (pansies, columbines, and cabbages, for example) can be moved to a cold frame in early March if the weather is "normal." A simple but very workable frame can be made with four boards nailed together and fitted with a sash of glass or plastic. Another very simple plan is to use a heavy wire frame that can be draped with plastic sheeting to make a small dome-shaped or tent-like shelter.

## Time Table for Starting Seedlings

### February

Perenial flowers that prefer cool germination (cold-resistant seedings that should be hardened off and exposed to somewhat cooler temperature, so that they can be planted outside in early spring): hardy alyssum (Basket of Gold), hardy candytuft, pinks, and other rock garden perennials; perennial campanulas (like peach bells), columbines, various types of delphiniums, including Chinese, Belladonna and Bellamosa varieties, and tall-growing hybrids like the Round Table series; gaillardias, coreopsis, shasta daisies, tufted pansies (violas).

Annuals that take a long time to mature because they grow so slowly. They must be protected from frost and should not be planted in the garden before May 1. Included are petunias, snapdragons, new varieties of coleus, and fibrous rooted begonias.

Hardy vegetables that can be set out in the garden in very early spring: cabbage, cauliflower, celery, parsley, and onions. Beets and lettuce can be started in pots for early transplanting.

### March 1–15

Annual flowers: ageratum, verbenas, annual pinks, torenia, salvia, *Vinca rosea,* dwarf bedding dahlias.

Vegetables: sweet peppers, Chinese celery, and broccoli.

### March 16–31

Annual flowers that grow rapidly: asters, calendulas, cockscomb and the decorative celosias, Chinese forget-me-nots, annual gypsophilia (baby's-breath), annual phlox, scabiosa.

Vegetables: eggplants, tomatoes (preferably wilt-resistant and hybrid varieties for best performance).

### April 1–15

Annual flowers: annual alyssums, cosmos, various types of marigolds and zinnias. These seedlings can be moved to the garden in early May.

Vegetables: cucumbers, melons, and even pole lima beans can be started in peat pots. These tender vegetables can be moved to the garden after April 15 if they are placed beneath a plant protector. Otherwise it is best to wait until early May.

# THE ALCOHOLIACEAE: A MONOGRAPHIC ACCOUNT

My studies of this unusual family of plants began eight years ago this last Christmas when I received from the first man to recognize it, an inscribed copy of his invaluable encyclopedia.* Later editions of EXOTICA grew larger and larger, less easy to hold in the hand, and I finally carried my own copy over to the office. In easy reach of the telephone, it has been invaluable in answering questions about the kinds and names of houseplants which come to me from scientific collegues and the general public.

It was not until last summer while using one of Mr. Graf's convenient indices, to answer a phone call, that in running my eye down a column it lighted on the specific name "*cocacoliensis.*" As soon as I had a spare moment I went back to the "Index of Plant illustrations" to find the whole reference. This was quite a job, for after a long telephone conversation all my mind retained was the word "*cocacoliensis*" and a vague impression that it was in a genus fairly far along in the alphabet.

When I found the reference it was a surprise. It indicated that *Rumandia cocacoliensis* was illustrated on page 000, and there was no such page. This made it fairly certain that Mr. Graf, a dignified and successful business man (who produces EXOTICA in his so-called spare time) was up to some sort of monkeyshines, yet he definitely does not look like that kind of person. I searched for Rumandia in one or two books and found no mention of such a genus. Then I tried some of the other indices in EXOTICA and finally consulted Mr. Byrd's ingenious coded summary of botanical and practical information on page 500.

It was all there under 'R' and in this reference he had really been kicking up his heels:

RUMANDIA *Alchoholiaceae* C I S W
*cocacoliensis* (Antilles) 'Cuba libre,' tall, stemless, succulent, with brown, frosty bloom, often with lemon flavor; good in summer: keep cool.

The code symbols "C I S" and "W," I looked up in the proper place. The first indicated "Useful in cool, intermediate, and hot Tropics" the latter "Never allow such plants to dry out." Further study and consultation with experts yielded only negative information. I could find no references to Rumandia in later editions of EXOTICA, and though two of my colleagues have known Mr. Graf longer than I have, they had never stumbled on to his botanical analysis of the Cuba libre, nor could they suggest what further mischief he might be up to with the name Rumandia. Perhaps some reader of the BULLETIN can give a clue as to any significance, beyond "rum and I."

At least we now have a short item to lay beside Edward Lear's classical foolishness, in the world's pitifully small store of Botanical Nonsense.

EDGAR ANDERSON

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*EXOTICA. Pictorial Cyclopedia of Indoor Plants. Alfred Byrd Graf. Julius Roehrs Company, Book Department, Rutherford, N. J. 1957. (There are several editions.)

## BOOK REVIEW

***Creative Decorations with Dried Flowers*** — Dorothea Schnibben Thompson. Hearthside Press, N. Y. 1965. $6.95.

THIS attractive primer of 125 pages was written by the wife of a Chemistry professor who helped her develop the drying of flowers with silica jell so that much of their color was retained for some time after drying. It deals exclusively with that technique though it scarcely mentions its particular difficulties.

Some of the decorations illustrated in color would be attractive in almost any living room but the manual as a whole is as feminine as a boudoir. Among other items it illustrates and gives full directions for: (1) Plastic butterflies in pastel shades, bearing dried red celosia blooms to make the body look velvety while clusters of dried forget-me-nots form blue spots on the wings. (2) A lady's hat of peach-basket size, completely covered with dried flowers and dried leaves. (3) Painted sardine tins with gold beading around the edges, made to exhibit tiny toy animals and dried flowers on the walls of a child's bedroom.

All of this is very jolly, and I am sure the little girls were delighted with such bright bits of nonsense. However, before he tip-toes away, may a male reviewer suggest that the book might also have included such stately arrangements of dried flowers and leaves as those one sees at Charlottesville, Williamsburg and Natchez. A comparatively small group of southern gentlewomen have developed the production and display of dried flowers into a fine art. The manual's inclusive title would suggest that such decorations could well have been illustrated.

EDGAR ANDERSON

## HOW TO RAISE MORE COLOR FOR YOUR GARDEN

IT'S not too early to plan annuals and new perennials for next summer. The course, "How to Propagate From Seed," begins on March 15 (afternoon section) and March 17 (evening section) and continues for five meetings. It is particularly suited to inexperienced gardeners who wish to acquire basic growing procedures. The Garden supplies all necessary materials. The lectures cover practical information about preparing flower beds, fertilizing, spraying, and much more. The course fee is just $12.00 per person, a bargain for five weeks of practice in raising plants *to take home to your garden*. For registration phone TO. 5-0440, Monday through Friday.

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The Missouri Botanical Garden is a fund member of the Greater St. Louis Fund for Arts and Education.

# LECTURES JUST FOR THE FRIENDS

A Series of Five Lectures is a bonus the Friends of the Garden gives its members in 1966.

Who would want to miss out on "Early Spring Garden Preparations" which will be the first lecture February 15, to be followed by "Plants Best Adapted to the St. Louis Area," "Ferns for Home and Garden," "Plant Propagation from Cuttings," and a truly unique lecture on "Preparation of a Floral Display."

These lectures will be under the direction of staff members as well as guest speakers and will not be open to the general public. The other spring dates are March 14, and April 18; the times for all three lectures are from 10:30 till noon. There will be one evening lecture in late September and another in late October. All spring lectures will be at the Museum Building just inside the Cleveland Avenue Gate, 2221 Tower Grove Avenue. So be sure your membership in the Friends of the Garden is in good standing as we know all of you want to be first in line to sign up for this whole course which costs you *nothing*.

Contact Mrs. Gleason at the Friends' Office if your membership is in doubt.

- *Surprise* packets of seeds will be given out at the first meeting.

# MISSOURI BOTANICAL GARDEN

# Bulletin

March 1966
Volume LIV
Number 3

## ON GROWING, USING, AND STUDYING HERBS

Cover: For this easy-care but attractive herb garden near Bass Rocks, Mass., flue tiles were placed on an outcropping of granite. (Note the original rock, lichens and all, in the foreground.) The tiles, painted a cerulean blue, were spaced to make a checkerboard pattern. The open squares, which serve as steps and walkways, were filled with fine gravel.

PHOTO COURTESY OF ELEANOR B. McCLURE

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Missouri Botanical Garden
Vol. LIV No. 3 Bulletin March 1966

# DESIGNING THE HERB GARDEN

ELEANOR B. McCLURE

THROUGH long years of contact with the gardening public I have found that there is a great appeal in the idea of having an herb garden. Moreover, some of them are visionaries who dream of a real gem of a planting, with neat beds and tidy borders that make an intricate geometric design. If possible, they'd add a sundial, decorative bird bath or garden figure.

While I have no quarrel with these laudable ambitions, let me point out that there is a tremendous difference between merely setting aside a patch of ground for a few culinary herbs, and tying to develop an herb garden of artistic design. In the latter case we must satisfy several rather rigid conditions.

*First:* The plants should thrive and grow well and be reasonably hardy. They should look well through the long summer season.

*Second:* Plants, beds, edgings and walks should combine to form a decorative pattern. If it is to be viewed throughout the year, the garden should also give good winter effect.

*Third:* A good herb garden should be functional, with beds planned for easy access. It should be possible to weed beds without trampling on plants, and to nip off a few herbs without stepping into the mud.

It is, of course, possible to have an herb garden that fits all of these requirements. In fact, I have ever so many magazine clippings of charming herb wheels, knot gardens and the like. I have visited a number of herb gardens that were beautifully designed and maintained—*usually in the eastern or northern states.*

Despite the handicaps of our mid-Mississippi-valley climate, there are a number of decorative herb gardens in St. Louis. The new herb garden at our Missouri Botanical Garden is an effective planting that has remained neat and attractive throughout the year. There are other good examples, and almost without exception they have been planned and maintained by devoted enthusiasts.

Other gardeners who sometimes try to take the easy way out, wonder if a few herbs *might* be included in the rose garden. This is a grave mistake, for the weekly sprays and dusts used on the roses will contaminate culinary herbs.

For the same reason, culinary herbs should not be used as fillers or edgings for flower borders. They may, of course, be planted as a decorative border for a vegetable garden.

The most satisfactory solution, however, is to design a separate herb garden. Select a spot in the open, for most herbs are sun-lovers that refuse to grow on the north side of a house, or in the sheltering shade of a tree. Then, before making the plan, give thought to the nature of herbs, and their habit of growth.

Some of the most useful herbs are weedy, rather untidy plants that aren't very decorative. While they can usually be groomed by judicious pinching and snipping, they are often neglected by gardeners who go away on long summer vacations. Moreover, some herbs have a trampish habit of throwing out spreading stems so fast that they soon invade and crowd out more modest neighbors.

Taking these things into consideration, the herb garden is best made up of many small beds, retained by curbs of edgings. Happily, the edgings and paths can be planned to make a pleasing design. As a rule, a simple pattern is easiest to plan and can be maintained with less effort.

A good starting point is to draw up a suitable plan on a large sheet of paper, working on a scale of one inch to two feet. Then list the desired herbs, taking note of size, habit of growth and the space that should be allowed for each plant. *It is then relatively easy* to fit the herbs into the plan, using them in pairs, in groups, or as edgings.

The tallest herbs, of course, should have a place at the back of the beds. Among these would be shrubby, buxom types like the sages, the lavender, the catnip borage, and rosemary. Herbs with airy foliage (fennel, rue and dill, for example) also make good background plants.

These taller herbs can be faced with groupings or bands of plants that have more compact habits: balm, sweet-woodruff,[*] parsley, chives, or various thymes. Some of these dwarfish herbs may also be used for edgings, provided they are clipped and trimmed from time to time.

A most attractive plant that has been highly recommended for edgings is *Teucrium chamaedrys*. Since it makes a dense growth and has fine glossy leaves, it does indeed make a winsome miniature hedge. Unfortunately, we have not had much luck in maintaining teucrium hedges in St. Louis county for year after year. Even with pampering and protection through the winter, many plants are usually lost, so that quantities of replacements are needed.

In place of teucrium (although they do give a very different effect) I can recommend two iron-clad perennials. The first is lamb's ear *(Stachys lanata)* —a low-growing plant that is aptly named, for largish pointed leaves are a silvery white, and have a soft, wooly texture. The foliage makes a very dense mat, forming a decorative border for either herb gardens or flower beds.

Don't try to grow lamb's ear in the shade, though, for this plant needs full sun. It is quite tolerant of reflected heat from walks and drives. When given a favorable spot it grows so rampantly that shoots must be cut back to keep it from invading the bed.

One of the most delightful of small plants is *Santolina chamaecyparissus.*

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but unlike the others it demands shade.

Densely branched and with fine leaves, it retains the silvery gray foliage through the winter. In its performance it is really a miniature broad-leaved evergreen. In spring it bears small, yellow-button flowers.

Santolina won't tolerate wet feet, but can endure heat, drought and freezes. When happily situated (where it has ample sunlight and good drainage) it seems practically indestructible. It is a good choice for ribbon edgings or borders, or can even be used to make a serpentine band in a patterned bed. Santolina is a low-maintenance plant, tending to form tidy mounds with a minimum of trimming.

It is difficult to maintain the pattern of an herb garden with plants alone. To insure a strong, pleasing design, accentuate the outlines with architectural materials. For example, permanent edgings can be made from bricks, cobblestones, cypress strips or railroad ties, depending on the plan of the garden. This gives the beds a neat and tidy look even when the herbs may not be at their best. These structural edgings certainly add to the overall winter effect.

Paths, which are an important part of the pattern, can be made of brick, gravel or bark shavings. Although brick paths are handsome, it is much easier to make gravel paths. We have used the ordinary white limestone gravel obtained from local quarries, pinkish tiff from the DeSoto area, and blue-gray trap rock. Any of these make a good walking surface, but the trap rock looks especially well with all sorts of edgings: bricks, cobblestones, railroad ties or even concrete blocks.

Before spreading the gravel it is best to apply a weed killer to the path area with a sprinkling can, saturating the surface soil. Then, for added insurance, cover the ground with a sheet of heavy black plastic (obtained from a building supply store). Thus the paths can be kept practically free of weeds and grass.

We have also found that it is helpful to confine mints and other rather vagrant herbs by planting them in flue-tiles which have been sunk into the ground. The holes in large concrete blocks make good plant pockets, too. These tiles, blocks or other planters should be spaced so that they conform to the overall pattern of the garden—and possibly enhance it.

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AN UNUSUAL COURSE concerning the flora of the woods and meadows of the Garden's Arboretum at Gray Summit will meet there on six Saturdays this Spring, March 26, April 9, 16, 23, 30 and May 7. It will be a paperbag-lunch, rain-or-shine affair, conducted by Dr. Edgar Anderson with the assistance of other staff members. If you want to increase your understanding of our Ozark heritage, call TO. 5-0440 promptly for further details; only a limited number can be accommodated this Spring.

# THE ST. LOUIS HERB SOCIETY

## Its First Twenty-Five Years*

MARY A. GAMBLE

To those ancient plants, the herbs, a span of 25 years is but a grain of sand beside a boulder; but to the members of the St. Louis Herb Society it is a splendid term—a quarter century—a happy silver anniversary. For the St. Louis Herb Society is 25 years old this year, having been founded on February 21, 1941, as the St. Louis Unit of the Herb Society of America.

It began with six St. Louisans who wanted to learn more about herbs, to use herbs, to enjoy herbs, and to share this knowledge and pleasure. Two of the six are now honorary members of the Society and as active in it as they were the day they discussed its beginning.

Mrs. Mary E. Baer, whom all past and present members regard as the Herb Society's founder, recalls it like this: "One evening at a dinner party in the winter of 1940 I sat next to George Pring of Shaw's Garden. We talked about herbs and I asked him, 'Why can's we have an herb group in St. Louis?' His answer was, 'Why don't you approach the one man in St. Louis who knows more about it than any one—Dr. Edgar Anderson of the Garden?' "

So, on a cold and blustery day in January 1941, Mrs. Baer and a fellow herb enthusiast, Mrs. Frances Weaver (now Mrs. Walter Hilliard of Ft. Lauderdale, Fla.) met with Dr. Anderson. When they told him the purpose of their visit he said, "I knew some day some St. Louis ladies would come to me." Then he went on to tell them of his first encounter with herbs which led to the founding of the Herb Society of America.

It happened in 1932 while Dr. Anderson was on the staff of the Arnold Arboretum at Harvard. One day he received a call from a Bostonian representing a small garden group. "We want to do something more worthwhile than the ordinary garden club," she told him, "so we've started studying herbs. Will you give us some botany lessons?"

With customary modesty Dr. Anderson informed her that he didn't "know a thing about herbalists' herbs," but added that he'd like to learn and suggested "we will study them together; then you can see how a botanist tackles a new problem."

This study continued throughout the winter and was extended to garden visits in the summer. In 1933 the group was incorporated as the Herb Society of America. Dr. Anderson was its first president and signed the legal documents of incorporation; he became president-at-large when he moved to St. Louis. His experience with this group led him to state: "Much of our botanical knowledge was not accumulated by scientists but by enthusiastic

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*With a long digression on "What is an herb?" See pages 12–14.

Mary Baer and Dr. Anderson (the two "founding members") examine the Herb Garden's sundial nearly buried by winter snow.

PHOTO COURTESY SHAW CAMERA SHOP

amateurs who have contributed enormously to the growth of knowledge."

There was no question of the enthusiasm for herbs of the two St. Louis women who were now—in 1940—taking the first steps toward an organized herb group for this area. Mrs. Baer had raised her first herbs in 1931, had written on herbs for the St. Louis Horticultural Society publication, and had done continuous reading and research on the subject. And in the Christmas season of 1940 these and Mrs. Weaver's efforts culminated in "The Little Herb House," where herbs and herb products were sold for the benefit of the war-time "Bundles for Britain."

"It all began with a hobby," recalls Mrs. Baer; "but then we got the idea we'd like to do something with herbs." The result of her brainchild was a shop—"old, as befitted herbs, but with modern ideas." With the help of Mrs. Weaver, plus a weekly volunteer crew of six, they prepared dried herbs, made herb vinegars, jellies, hand lotion, potpourri, sweet bags, pomanders—all from their own formulas or recipes adapted from old herbals. Most of the herbs were raised in the Baer garden, and the work done in the work shop in the basement of the Baer home. "The Little Herb Shop" (set up at Stix, Baer & Fuller) was successful, not only in realizing a substantial sum for its war cause, but also in stimulating wider interest in herbs in this locale.

With this background, and the assurance of a nucleus as knowledgeable and enthusiastic as the original Boston group, Dr. Anderson again agreed to lead a band of "herb ladies," plus a few hardy men. His endorsement led to the election to membership in the Herb Society of America of the founding members who then comprised the St. Louis Unit of the national society. In addition to Dr. Anderson—who justly can be called the "founding father" (he says "the relationship is more of a benevolent uncle") of both the national and the St. Louis societies—and Mrs. Baer and Mrs. Weaver, these members were Dr. David Fairburn, Mrs. George Roeder and Miss Edith Mason. The first meeting of the new unit was held on February 23, 1941, in the Museum Building of the Missouri Botanical Garden. Other charter members of the St. Louis Unit were Mrs. Charles Fitz-Gerald, the late Mrs. Edward Walsh, Mr. William G. Weld, Mr. Robert Miller and Mrs. Maria Regnier Kaufmann (now Mrs. Warren Krimmel of Camden, Ark.). Mrs. Baer was elected chairman of the unit, a post she was to hold for seven successive years.

The group's first goal was the study of 21 herbs, adaptable to our midwestern soil and climate. Dr. Anderson says, "we rode around in a station wagon and visited the few market gardens growing herbs; it was the *best* experience we ever had."

World War II was then in progress. It brought many problems and the Society members, like all their countrymen, were absorbed in them. However, the unit did continue to meet about four times a year when reports on plant studies were made and new herb flavors were savored. It was a time of great shortages in herbs, particularly those which normally were imported. On the national scale, the Herb Society of America was experimenting with ways to increase production of sage, digitalis and bella donna. In St. Louis the herb group found that the war had stimulated interest in growing herbs. More women were learning to cook with them, and took special pride in adding zest to war-time meals with herbs plucked fresh from their own gardens. "Why go to Dalmatia for sage," asked one fervent grower, "when what we grow at home makes the imported stuff taste like sawdust?"

For Christmas 1941 "The Little Herb House" venture was repeated, again spearheaded by Mrs. Baer, with the help of an increased number of volunteers who included members of the St. Louis unit. Again, proceeds benefitted "Bundles for Britain"; again, there was increased local interest in herbs.

Slowly, over the next several years, the St. Louis unit expanded its membership. Qualifications were—and remain—simple: any person actively interested in the study, culture and use of herbs was eligible. However, there was never any interest in mere numbers as such; no active drive for membership has ever been instituted. The original group described itself as "small and active," and it remains that way. In seeking members interested and enthusiastic enough about some phase of herbs really to *work*, there was developed a list of specific fields of interest which prospective members were asked to check:

"I have an herb garden; I am interested in herb cookery; I have done botanical work with herbs; I know very little about herbs but am very enthusiastic about learning more; I am interested in healing herbs; I have made a serious study of fragrant herbs in perfumery and cosmetics; I am interested in garden design; I am interested in writing about herbs; I am willing to serve as a speaker on herbs."

This list served the double purpose of guiding the group in directing the efforts of a new member, and in opening new doors of interest in the far flung field of serious herbal study. (At this time there was also an Associate Member classification which enabled those unable to work but who were interested in the future of the small group to help support its activities. These members paid higher dues and enjoyed no rights of membership other than attending meetings and receiving any published material. In recent years, this classification has been dropped as the Society felt it no longer served a useful purpose.)

The first major project of the unit was the establishment under Dr. Alice Tryon in 1947 of the sweet-scented Pelargonium Garden at the Missouri Botanical Garden. This collection of the exotic South African natives was described as "very valuable." It was maintained jointly with the Garden for many years and at its height comprised the largest and finest collection of accurately labeled scented geraniums in the New World.

In 1948 the St. Louis Herb unit celebrated its seventh birthday. One of the year's highlights was a handsome display of herbs at the Greater St. Louis Flower and Garden Show. And the group continued its hospitable, open-door policy by advising. "If any member knows of anyone who is interested in herbs, we cordially extend an invitation to attend our next meeting."

Meetings continued to be held in the Museum Building of the Missouri Botanical Garden. This fine old building, enjoyed by members and visitors alike, was described by Dr. Alice F. Tryon, a professional staffer at the Garden and an herb unit member, as "one of the quaint, red brick, Victorian buildings designed by George I. Barnett and built by Henry Shaw in 1859, [it] is a most appropriate meeting place for the St.

Louis Herb Society. It might be regarded as something of a large sized potpourri since it was planned as a storage place for a collection of dried and pressed plants and a mingling fragrance of herbs and cedar wood from the chests along the wall is still in the air.

"Some 50 years later after the building was no longer ample for the storage of the much expanded herbarium and library it was redecorated to be used as a meeting place for botanical lectures. The drawings of plants and birds on the ceiling were renewed and colored illustrations of Missouri plants from the series of American Wild Flowers by Mary Vaux Walcott were used to line the wall cupboards. Overhead, along the balcony there continued to hang the portraits commissioned by Henry Shaw: Carl Linnaeus, the Swedish doctor who developed the binary or two-word system of naming plants; and George Engelmann, the St. Louis physician and botanist who convinced Mr. Shaw of the need for a botanical garden in St. Louis; and others who appear to look down and give their sanction to those who come here to meet about plants."

In 1950 the St. Louis Unit was host to the Herb Society of America at its annual meeting held on May 23 through 25. Miss Edith Mason was then unit chairman. The program included tours of many of the most beautiful private gardens in St. Louis, and a visit to the Arboretum of the Missouri Botanical Garden at Gray Summit. There was also a tour of the Forbes Tea and Coffee plant where the gathering and commercial preparation of spices were studied. Mrs. Baer, whose potpourri could be seen in the Governor's Palace at Williamsburg, Va., demonstrated in her home how she made it. Each visitor left St. Louis with a "tussie-mussie," the Victorian nosegay which transmitted a message told in the language of the flowers.

The practice of featuring herb booths at local bazaars—begun in 1949—was continued, and unit members worked long and hard to make a variety of herb products, ranging from jellies to pomanders and potpourri, which were widely popular as holiday gifts. And at the unit's annual meeting which closed the year, Mrs. Bernhardt W. Klippel was elected its third chairman.

Things were beginning to hum. Plans were made for a new herb garden at Shaw's Garden which was to be the St. Louis unit's joy and responsibility. Miss Edith Mason, designer of many of the city's most distinguished gardens, was working on the plans. Her philosophy, as expressed in an article for the unit bulletin (published spring and fall) foreshadowed the plan.

"We have to think of the design of the garden in relation to the amount of time and energy we have to devote to its care," she wrote. "Well cared for plants in straight rows will give more pleasure and satisfaction than the most complicated design uncared for. No matter what design the garden is, plant ecology is most important—their relation to one another, their habits and soil requirements."

When at last the garden became a reality in the spring of 1952 Mrs. Klippel described it like this: "It is in a shady enclosure, situated directly east of the library (on Tower Grove Ave., a site which Dr. Anderson notes was chosen for 'practical administrative reasons'), the walls of which serve as a background . . . We will need the cooperation of all members in the planting of this garden."

Members who "cooperated" under the hot Missouri sun could declaim with deepened feeling these lines from Kipling's "The Glory of the Garden":

> "Our England is a garden, and such
> gardens are not made
> By singing: — 'Oh, how beautiful,
> and sitting in the shade."

In this same "year of the garden" unit membership reached 50. In the annual report of this eleventh year it was noted that the unit has "grown from a nucleus of six. . . . As we scan the accomplishments . . . we realize how much of it is due to the enthusiastic and untiring efforts of these original six members."

Nineteen fifty-three was a banner year; Mrs. Edward A. Blank was unit chairman. Enthusiastically the St. Louis group undertook its most ambitious project to date and turned in a resounding success. It planned and conducted a "Cook's Tour" of 15 St. Louis area, kitchens and gardens, ranging from a contemporary kitchen to a complete dairy farm. Herb products, including herb charts, hand-decorated tiles, place mats, pomander balls, potpourri, bayberry candles, herb literature and potted herb plants, were sold in a charming "shop" set up at one stop. Proceeds went to the Missouri Botanical Garden and towards the support of herb gardens developed by unit members at the Campbell House, the People's Art Center and Washington University.

Mrs. Charles Fitz-Gerald (later a unit chairman) was responsible for much of this activity. An ardent herbalist, Mrs. Fitz-Gerald was described in a local newspaper article as a worker "in two gardens besides her own. She tends a kitchen herb plot at the Campbell House and has planted and cared for one on the Washington University campus for the past two seasons. . . . She has still another interest this spring in helping to give a proper 18th century air to the grounds of the Bolduc Houe at Ste. Genevieve, Mo." (This is the old home built in 1770 by a French settler, Louis Bolduc, and restored in the late 1950's under the auspices of the Colonial Dames of Missouri.)

In 1954, in its "mint project," the St. Louis unit, under the leadership of Dr. Alice Tryon, undertook to unravel one of the world's most complicated plant ties. At the time Dr. Anderson wrote: "No one knows the cultivated mints of the world perfectly, not even the experts, but with modern methods of study they are not (like the thymes) an impossible mess. In Dr. Tryon we have a trained student, far enough into the problem to know what to do next, in close enough personal touch with other authorities . . . so that authentic living material is readily available for our collection. With the support and interest of the rest of the unit no one can say to what heights of accomplishment we may not climb."

The mint project flourished as

mightily as did the mints for a number of years. As they enjoyed its progress the majority of the unit's lay members found themselves in agreement with the ninth century Walafrid Strabo who wrote this of mints in his "Hortulus": "How many there are I might as well try to count the sparks from Vulcan's furnace beneath Etna."

In December of 1954 two factors led to the withdrawal of the St. Louis unit from the Herb Society of America, a step taken with deepest regret. The first involved procedural difficulties which could not be resolved to mutual satisfaction. The second was the growing conviction among a majority of the St. Louis unit members that more could be accomplished by a small group if its total energies and financial resources were focused upon locally oriented projects and plans. A new constitution was written and adopted at the February 1955 meeting. The group became the St. Louis Herb Society with its stated purpose to "further the use and knowledge of herbs." "Our membership," noted the incumbent St. Louis chairman, Mrs. C. William Schemm, "shall continue the study and promotion of herbs as an individual body."

A seal, embodying the year of the newly reorganized group's founding, the Society name and its statement of purpose, surrounded by a wreath of six well-loved herbs, was conceived and drawn by Mrs. Rollo Horwitz, a professional-artist member. At this time active membership was limited to 50; officers were elected at the June meeting for two-year terms.

The distinctive seal soon appeared on labels distinguishing herb products prepared by the Society members for sale in herb booths maintained in various community bazaars over the following years. Led by Society president Mrs. Jessie Osborn, the members continued their serious studies of individual herbs. In May 1956 the Garden honored their work by devoting an entire issue of the scholarly Missouri Botanical Garden BULLETIN to it. The 12 by-line articles were illustrated by Mrs. Horwitz' drawings of herbs executed in the manner of the wood-cuts appearing in the old herbals: Gerarde's, published in 1636; Matthioli's in 1560; Parkinson's in 1640. Later these drawings appeared on attractive stationery which also featured herb recipes.

Herb Society members continue to study, and to write papers which, from time to time, appear in the BULLETIN.

Also in 1956 the Society established the Henry Shaw memberships. These are annual (dues-free) memberships granted by the president of the Society upon recommendation of the Director of the Missouri Botanical Garden. Eligible are professionals and trained botanists whose advice and help would be of great value to the group as a whole. In the past they have been held by Dr. Alice Tryon and Dr. and Mrs. Frederick Meyer. (Dr. Tryon and Dr. Meyer were also active members at one time.) In 1966 the Society welcomed the following Henry Shaw members: Dr. Walter H. Lewis, Director of the Garden's Herbarium; Mrs. Walter H. Lewis, associate professor of botany at Washington University; Miss Melanie Brown, assistant in the

Herbarium; Kenneth O. Peck, instructor at the Garden.

IN THE Society records new names appear among the active members, while some familiar ones disappear. The Society found that while many people are eager to learn about herbs, only a relatively small number have a continuing, active interest. Many satisfied their curiosity about herbs in their specialized fields and, while retaining a broad and sympathetic interest in the Society's work, no longer wanted to continue the study implicit in a group devoted to that purpose. The keen, dedicated nucleus remained, but there was a fluctuation in membership which, it was agreed, was good. It insured the steady flow of "new blood" needed to furnish new ideas, new approaches, fresh enthusiasms. And certainly it was fun for the "experts" to help newcomers find their way along the many roads and byways which lead to a competent, useful knowledge of herbs.

A growing herb library held the keys to much of this knowledge. At first it was "circulated" in an old doll trunk which had belonged to Miss Mason. Any member had the privilege of taking the trunk home from one meeting to the next. An early "librarian" described its possession as an "exciting experience . . . rather like opening a treasure chest." In recent years the Society has tried to add a book-a-month, concentrating on the more general and popular rather than specialized works.

In 1957 when Mrs. James B. Fisher was president the Society sponsored two prizes to be given to architectural students for sculpture designs created with the Herb Garden at Shaw's Garden in mind. Dean Joseph Passoneau of Washington University presented the awards.

In 1959 the Society, with characteristic enthusiasm, entered into plans to help celebrate the Centennial of Shaw's Garden with a sale, held at the Garden in a delightful al fresco setting. Its bucolic charm was shattered somewhat when a violent wind and rainstorm blew in, but sunlight and order were restored the next day and the Society booth registered a modest success. The chairman of the Centennial wrote Mrs. Edgar Anderson, then Society president, "The Herb Society is setting such a wonderful example."

This event at the Garden was followed by the series of "Garden Gate" Sales held under the sponsorship of Famous-Barr in Clayton. The Herb Society participated from the first, in 1960, to the last, in 1964. And it took pride each year in besting previous figures. For several years its booth featured both herb products (jellies, chutney, curry powder, seasoning salt, mustards, vinegars, herb teas, etc., made by members) and herb plants. One notable year, under the direction and with the help of Mr. Paul A. Kohl, floriculturist at the Garden, the members raised 7500 herb plants from seeds, cuttings, root division. Members vied to be on the "potting teams" permitted by Mr. Kohl to work in the greenhouses on the herb plants earmarked for sale at the "Garden Gate." The Society took particular delight in producing thrifty, healthy plants which would create more herb enthusiasts in the St. Louis area.

In 1961, when Mrs. Edward A. Cox was Society president, the St. Louis Herb Society Cook Book was published and made its debut at the "Garden Gate" Sale. Long a dream of the Society, the cook book assembled recipes collected over a span of years from virtually every member. Designed as both an introduction and guide to cooking with herbs, its recipes range from simple to gourmet. It seeks to inspire cooks to "make the *extra-ordinary* out of the ordinary" to demonstrate that if flavor is the soul of cooking, as an old saying goes, then herbs are the soul of flavor. The cook book went into a second printing in 1962 and is still selling briskly. It can be purchased from the "Garden Gate" Shop at the Main Gate of Shaw's Garden, or from Society members. Its charming design and illustrations were created by artist-member Louise Horwitz.

The Garden Gate sales afforded an unmatched opportunity to "further the use and knowledge of herbs." Society members answered endlessly the general questions most often asked: What does the Herb Society do? How do you use this herb? Just what is an herb? Those who've read this far, and who read on to THE END will know what the Society does; the Herb Society Cook Book is an excellent source of answers to the second question; but the third—what is an herb?—well, that is a *big* subject.

*What is an herb?* This intriguing, fascinating question has yet to be answered with complete clarity, and we doubt it ever will be. One thousand years ago Charlemagne, the great Frankish emperor, was discussing this very question with Alcuin, the Irish monk brought to the ruler's domain because of his knowledge of plants.

"What is an herb?" Alcuin asked Charlemagne, who replied, "An herb is the friend of physicians and the praise of cooks." Many "herbers" consider this the most delightful, if inexact, answer which has been given to this age-old query.

"To the botanist," says Dr. Anderson, who is himself a botanist of world repute, "the botanical term 'herb,' though it goes back to the same Latin root, is quite a different word from 'herb' in common speech, cook books or gardening literature." He goes on to explain, "When we scientists take a word and make it precise enough to use in scientific work, we 'pay it extra' as Lewis Carroll said. We give it a scientific career of its own! The simplest example is 'vegetable.' Scientifically it means 'derived from or comprising plants.' Botanists wouldn't have the slightest compunction about using both the scientific and common word in the same sentence; for instance: 'Flowers and vegetables are among the choicest gifts of the vegetable kingdom!' In answering vistors' questions I have frequently said: 'Here of course we treat such herbs as rosemary practically as though they were herbaceous but in warmer climates they are shrubs and get very woody.' "

The botanist defines an herb as a soft-stemmed plant, a plant with no woody tissue, which narrows the field and eliminates many of the traditional *herbalists' herbs*, to say nothing of the spices! Possibly the most exact definition of an herb, as the herbalist uses the term, is that given in the Oxford English Dictionary which states that the word herb is "specifically applied to plants of which the leaves, or stems and leaves, are used for food or medicine, or in some way for their scent or flavor." The same dictionary defines a spice as "one or other of various strongly flavoured or aromatic substances of vegetable origin, obtained from tropical plants, commonly used as condiments or employed for other purposes on account of their fragrance and preservative qualities." Geographically, most herbs are natives of the temperate or sub-tropical areas of the world, while spices flourish in tropical regions.

This matter of nomenclature and identification has bothered serious students of plants for centuries. In 1657 a gentleman named Coles noted: "This Herbary Art hath since groaned under the defects of many unworthy Authors." His complaint is echoed some 300 years later by botanist Dr. Anderson who says, "I wish instead of discussing the technical, botanical use of the word, writers on herbs would trace its career in common speech and demonstrate what a lovely word it's grown to be."

Dioscorides, the first century Greek physician, whose mammoth work, "De Materia Medica," contained his evaluation of the medical "virtues" of some 600 plants and set a standard for more than a thousand years. The successive "herbals" which followed his throughout the ancient and mediaeval eras were imbued with the same spirit and approach to the study of plants; their *uses* and *values* were copied from those described by the Greek. Even the drawings were copied so that less and less exactness occurred as artist copied artist, rather than nature. The true botanist's devotion to observation and personal experience did not come along until later.

Both point of view and method contributed to the development of the everyday or "folk" understanding of herbs and herbalists, those who studied and used the plants. And the intermingling of true herbal lore and witchcraft which characterized the Middle Ages compounded an already considerable confusion.

All too often there is a failure to clarify the point of view from which an herb is being studied or defined, leading to the just complaint of Dr. Anderson and his botanical colleagues. The St. Louis Herb Society, as a group dedicated to the furthering of both the *knowledge* and *use* of herbs, hopes it can contribute to a clarification of the strictly botanical versus the substantive meaning of herb, and hastens to add that it is the latter to which it subscribes in its general approach.

The word *herb* comes from the Latin *herba*, and reached England via the Romans and the Old French *herbe* or *erbe*. In spoken or street Latin, and in Old French, the *h* was silent, although it usually appeared when the word was written. The educated English sounded the *h* and that pronunciation came with them to New England. Today the English and many New Englanders say *h*erb; most other Americans say *'erb*, and this is given preference in popular dictionaries. However, either or both is correct. The herbalist, who is usually also an individualist, takes his choice!

The history of the St. Louis Herb Society is sparked with evidence of the time and thought its members have given to this insistent question, "What is an herb?" They have turned to old writers to learn how the word grew in use. They read Capt. John Smith's 1616 description of New England in which he wrote, "Many hearbes in the spring time are commonly dispersed throughout the woods . . ." And André Michaux' notation in 1795 that he was "herbarising in the Bleue Ridges . . . of the New World." And Watts' "Logic" which stated in 1725, "If the leaves are of chief use to us, we call them herbs."

In 1633 a G. Herbert wrote of those "who want herbs for their wounds"; and in 1726 Jonathan Swift made note of the "new sect of herb-eaters (the vegetarians)." And in 1885 a line appeared in print about the "simplers, or herb-gatherers . . . [who] supplied the herb-shops in Covent Garden"; while in 1695 another English herbalist wrote, "I went and herbalized in the downes and woods with the gardner of the medicine garden."

From the beginning, those who have written about herbs . . . herbals . . . herbalists . . . herbalizing . . . and any of the multiple variations of the words, have stressed one thing: USE. The plants called herbs were those used, first, in medicine, then in cooking and household ways, for personal grace and comfort, and lastly for sheer delight. With this in mind, the St. Louis Herb Society defines an herb simply as "a plant with a use." Admittedly substantive, this definition may not satisfy all. In fact, we predict that when the Society is 50 . . . *75* . . . *100* years old its members still will be seeking the perfect definition of those useful plants which some of them will call *h*erbs, others 'erbs.

To repeat: What is an herb? The answer depends upon where you stand.

Over the years the St. Louis Herb Society has sought to foster this broad understanding of herbs, their legend and their uses. Early in its history it established a Speakers Bureau to provide knowledgeable, experienced growers and users of herbs to speak before community groups seeking to increase their knowledge of the field. A fee, beginning at $10 for small groups, is charged. This fee goes into the Society's funds which, in turn, help maintain various projects, usually at Shaw's Garden. Speakers tell of the history and lore of herbs, their culinary, medicinal, household and cosmetic uses over the years, their culture. Upon special arrangement, more elaborate programs are worked out, with food and other demonstrations.

For example, in 1963 when Mrs. J. Glennon Schreiber was Society president, six members "staged" a demonstration and talk for the Museum of Science at Oak Knoll. Two members gave the first demonstration of how the Society's famous curry powder was blended, following a 14-ingredient recipe brought from India by a former member, and with questionable modesty described as "the world's best."

The most-used culinary herbs were shown and described; a paper traced the fascinating history of herbs and spices through the centuries when frequently they were rarer and more precious than rubies or gold.

In the spring of 1964 when Mrs. Eli M. Strassner was Society president, a symposium was arranged for the Montgomery City Garden Club and held in that city, some 80 miles west of St. Louis. Almost every phase of herbing was touched upon: culture, cooking, household uses. As the amount of equipment needed became apparent, the symposium earned the name "safari" and was so designated by the 12 members who had volunteered eagerly to plan and produce the program.

And in January of 1966 the St. Louis Herb Society, in cooperation with the Home Service Department of the Laclede Gas Co. conducted its first cooking school, called "Adventuring with Herbs." Two complete menus—one "gourmet," the other "family"—featuring the use of great culinary herbs were presented by Society members, assisted by Laclede's professional staff. Herb products, prepared by members, were sold during an intermission at which wines and herb butters and breads were tasted. Proceeds benefited Shaw's Garden.

But we must backtrack to 1963 when work on the Society's *new* herb garden at the Missouri Botanical Garden began. While there was never any question of the charm or beauty of the first herb garden sponsored by the St. Louis Herb Society at the Garden, over the years it became evident its location was a handicap to the fulfilling of its primary purpose of making an ever-growing number of visitors to the Garden aware of herbs. People who found the old garden loved it; but not everybody found it, even with directions. Therefore, it was agreed that at the earliest propitious moment a new, accessible, more central location would be selected and, when that was done, the Society again would sponsor the herb garden to be installed there.

The perfect spot was chosen, It was an area 56 × 44 feet directly south of the Shaw House. Appropriately, the kitchen windows of the handsome old house overlooked the plot and the back door opened directly on to it. Again, Miss Edith Mason was the designer. The plan is formal, the brick walks wide enough to invite a stroll or accommodate a wheelbarrow. The beds afford ample room for a bountiful harvest of culinary and household herbs, and all are easily accessible. Benches suggest relaxation and reflection. A Victorian wrought iron fence encloses both the herb garden and its neighbor, an old-fashioned flower garden. Miss Mason designed both gardens to be complementary, to enhance each other's charms.

A hexagonal bed, planted in a variety of creeping thymes, is the focal point of the herb garden. Just south of this bed a plaque reading "GIFT OF THE ST. LOUIS HERB SOCIETY . . . FOR USE AND KNOWLEDGE" is set into the brick paving; and centered in the thyme is an enchanting English lead garden figure, a slim and supple youth who leans over the dial and daydreams the hours away. This figure was the gift in 1965 of an early Society mem-

At the annual "Food Specialty Meeting," four members obligingly pose for the photographer. That year the subject was Cold Soups and Herb Appetizers and each is supposedly sampling one of the entries.

PHOTO COURTESY OF THE POST-DISPATCH, PHOTOGRAPHER JACK JANUARY

ber, Mrs. Herman Husch. It captivates all who see it; and it is especially dear to Society members because it came from the donor's garden. Now, in its new garden home, it symbolizes the continuity which endows gardens with much of their enduring charm.

The new herb garden, which was first planted in the spring of 1964, is seldom without visitors. Society members working in the beds take equal delight in answering questions about the 50 herbs planted there, and in being complimented on their industry. But because there isn't always a worker at hand to answer the questions, the Society, in summer 1965 published with the cooperation of the Garden Board, a "Thumbnail Guide" to the herbs planted there. This guide was planned to answer the questions most often asked. Executed by artist Louise Horwitz with the flourishes and sentimental touches which characterized many of the old herbals and similar guides, it is also designed to be a souvenir of a pleasant sojourn in a traditional garden, filled with herbs, the useful plants. (The Guide is for sale, at a nominal price, in the Shaw House.)

In its 25-year history the St. Louis Herb Society, even when it has been busy with a major project, has worked hard to make its monthly meetings both informative and fun. Since much herbal knowledge is gained from the sharing of personal experience, there was never enough time for an adequate exchange of such information. In

Members getting their Herb Garden in shape for next spring, towards the close of the first season.

PHOTO COURTESY OF THE GLOBE-DEMOCRAT, PHOTOGRAPHER DICK WEDDLE

1962 the Society added "coffee hours" at the close of each regular meeting (the Society meets each month except January from October through June). The refreshment hours, while enjoyably "social," also serve a more serious, creative purpose. Many are incorporated into the program and become an extension of it. Members not only demonstrate new variations on old themes (for example, Gazapacho, the classic chilled Spanish soup, made in a blender for a new and delightful texture), but also report on new herb sources and products, as well as creating their own.

A typical meeting might be devoted to herb breads and spreads, with an array surprising even to old-timer "herbers." Other themes developed are regional and national tastes and preferences in herbs, always with the purpose of illustrating culinary research, experiment and success. Through the sharing of the recipes of the dishes studied, the Society's culinary repertoire is enhanced and its members become even better cooks. Here again, the *use* of the culinary herbs studied and planted is the ultimate subject of study.

This same emphasis on *use* is stressed in workshop meetings held annually or when appropriate. Members learn through demonstration by one with exceptional "know-how," and through their participation, the secrets of such age old herbal products as potpourri, pomanders, sweet bags, herb wreaths, etc., always with the use of newer methods where these are proved better.

In short, there are few secrets among fellow herb enthusiasts; sharing is one of the precepts of herbing. For many years the Society has recognized this by opening the season with a "Share Your Harvest" program in which members bring generous samples of their summer successes in canning, drying, preserving, etc. And each spring there is a "Green Thumb" meeting in which seeds and plants and cuttings are shared so that all members' gardens benefit. Through the years much of all herbal knowledge has descended through this generous spirit. The 17th century lady of the manor who shared her "still-room" discoveries has her counterpart in the modern herbalist who presents a paper on her herb specialty; the pioneer who shared a packet of precious seeds is matched in spirit by today's suburbanite bringing to a meeting a plastic bag of seeds or cuttings gleaned from her garden.

Field trips have enabled Society members to maintain acquaintance with the native wild flowers and weeds and herbs. Usually, members have enjoyed the good fortune of having Dr. Anderson as their charming and learned guide.

The Society's regularly planned year is a process of learning, affording all members—new or old to herbs—the opportunity to sharpen their skills, explore new ideas of interest, widen their herbal horizons. In their quarter-century of studying and working with herbs, the members of the St. Louis Herb Society have learned that "herbal" encompasses almost every area of everyday living: plant culture, cooking, medicine, literature, conservation, homemaking, handicrafts, geography, economics, and on and on. They have learned that to trace the family of herbs from its beginning is to learn what the world has been like since time began; to look ahead—through the eyes of students, scientists and researchers—to the future of these useful plants is to keep abreast with progress.

In its 25 years the St. Louis Herb Society has had many exceptional members. Obviously, few can be mentioned in this brief accounting. There have been five honorary memberships, bestowed by unanimous vote at an annual meeting for "recognition of notable service to the general spread of knowledge or use of herbs." Those so honored are: Dr. Edgar Anderson, Mrs. Mary E. Baer, Miss Edith Mason, the late Mrs. Edgar R. Rombauer, and Mrs. Merna C. Lazier.

Society chairmen and presidents have been: Mrs. Mary E. Baer (1941–1948); Miss Edith Mason (1948–1950); Mrs. Bernhardt W. Klippel (1950–1952); Mrs. Edward A. Blank (1952–1954); Mrs. Charles A. FitzGerald (1954); Mrs. C. William Schemm (1954–1956); Mrs. Jessie Osborn (1956); Mrs. James B. Fisher (1957–1958); Mrs. Edgar Anderson (1958–1960); Mrs. Edward A. Cox (1960–1962); Mrs. J. Glennon Schreiber (1962–1964); Mrs. Eli M. Strassner (1964–1966).

The St. Louis Herb Society will celebrate its twenty-fifth birthday, not on the actual birth date of February 21st, but in the magical month of May, the Gardener's month. The occasion will be a garden party with a traditional Mai-Bowle served to members past and present, and to friends of the Society. The setting will be the new herb garden where all can enjoy the simple beauty of the plants so rich in history and use. A highlight will be the presentation of a birthday check to Shaw's Garden in appreciation of many happy years past, and in anticipation of felicitous, fruitful years to come.

And for itself, the Society's silver anniversary wish is that all St. Louisans and all sojourners in our city will visit the Herb Garden at Shaw's Garden and discover in it the fascination and beauty of those simple, useful plants which from time immemorial, have been the servants and friends of man.

THE END

## OLD AND NEW USES OF SOUTHERNWOOD,

### *ARTEMESIA ABROTANUM*

A GOOD many of our oldest herbs owe their selection and survival to a "nice, clean smell." During the long centuries when soap was not common or cheap, keeping the air from becoming foul in dining halls and churches was a real problem. Those who could afford to, grew "strewing herbs" in quantity. Floors were covered with sweet-smelling or pungent plants that gave off their fragrances as they dried, until they were replaced with a fresh set. This was long the chief use of southernwood.

In old gardens in the South where it is perfectly hardy (in St. Louis it requires good protection) there is usually a big bushy plant of it, or a pair of them, right at the entrance. One soon forms the habit of pinching off a leaf and smelling it when visiting such a garden. It has an odor tantalizingly different from anything else—pungent like chrysanthemums, clean like peppermint, sweet like lavender, yet more subtle than any of these.

It recently occurred to us to dry a small branch (see rear cover) and use the dried leaves in making a sachet for a lady's purse. It was just the thing and has kept its fragrance for several months. Time will tell whether (like mint or vetiver) it will hold the smell for years or need freshening next season.

# THE CHELSEA PHYSIC GARDEN, YESTERDAY AND TODAY*

## How an ancient center for Apothecaries and Botanists continues to play an important role in modern Science

MARY E. BAER AND EDGAR ANDERSON

In spite of urban crowding and high-rise apartment houses, parts of Chelsea keep a good deal of their charm though busy London presses in on every side. The house Thomas Carlyle lived in a century ago is carefully preserved and there are others of about the same period still remaining. Though some have been cut up into apartments and studios, a growing number have been sympathetically restored and are now some of the most elegant town houses in all of London. There are over a score of others of about the same period close by, most of them, like Carlyle's, lining a beautiful street along the curving Thames, Cheyne Walk (a variant spelling of Cheney and named for the same Lord Cheyne from whom Sir Hans Sloane purchased the Manor of Cheyne). A few of these acres were given by Sir Hans when he set the Apothecaries Garden up on a firmer footing in 1722. In spite of the roar of traffic along the Thames, Chelsea somehow maintains an air of village peace.

One of the main reasons this area remains so sound at the core is a tiny botanical institution of a few acres. Through nearly three centuries it has tended to attract the right kind of neighbors. It has played changing though important roles in our understanding of plants since it was first set up in 1673. Its official name, The Chelsea Physic Garden, dates from the time when "physic" retained its original meaning of "the art of healing."

Originally it had been the area in which "The Worshipful Society of Apothecaries of London" grew and studied the plants used in their remedies. They became one of those "City Companies" which make the annual procession of the Lord Mayor of London such a colorful pageant. King James the First had encouraged the group to split off from the Grocers Society in 1617 in order to improve the quality of drugs and the standards of those who sold them. When the Grocers still tried to force the Apothecaries to remain in their organization (one is reminded of modern labor unions) the King gave it as his royal opinion that "grocers are not competent judges of the practice of medicine." One of the most active of the Apothecaries was Thomas Johnson. In 1633 he revised, and greatly extended, Gerard's Herbal, making it practically a new book, though he modestly retained the old title. It was widely circulated and became the last of those great herbals whose quaintly effective woodcuts and rambling descriptions fascinate those who are privileged to read them.

As Botany continued to grow out of

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*With a short digression concerning the personality of the great Linnaeus.

Sir Hans Sloane, the great patron of the Chelsea Garden. His collections formed the nucleus for the British Museum. As a botanist he discovered the Gulf Stream. Recognizing the giant beans which frequently washed up on the northwestern shores of Great Britain as coming from plants he had studied when he explored Jamaica, he postulated a strong current in the Atlantic, coming northward out of the Caribbean and curving around north of Scotland.

PHOTO BY MARY BAER

magic and into a science the Chelsea Physic Garden continued to increase its reputation. Tiny though it remained and subject to recurring financial crises, it became one of the important centers in which was worked out Man's first approximate understanding of the World's flora. It was the home of such men as Phillip Miller, William Curtis and John Lindley. Since the beginning of this century it has grown into an important adjunct to the Universities and Technical Schools of London. Its greenhouses, library, lecture halls, laboratories, and experimental plots are now exclusively devoted to the students and staffs of these various institutions; in the year 1963, for instance, 3,750 students used its facilities. These important scientific and educational projects now take every minute of its time, nearly every inch of its space, and every penny of its budget.

With 12 University Colleges, 6 Medical Schools, 12 training colleges and 8 Polytechnical schools using its services, it has long since ceased to be a display garden or in any way a park. When one of us went there on a botanical errand in 1930 the dirty flower pots were still being washed in a handsome Jacobean lead water-tank, but the volume of botanical use is now so great that picturesque details of this sort have had to make place for modern work-a-day equipment. Through the locked gates one catches an interesting glimpse of the old garden; during the growing season one sometimes sees students, gardeners, and an occasional botanist, busy at work in the orderly experimental beds which fill much of the area.

Visitors who request permission to enter are politely and firmly refused, as they inevitably must be. Though the Garden has now become an important outdoor laboratory for all of London, it is still cherished by its neighbors. Its few acres merge with those of the old Chelsea Hospital and the two institutions make a real breathing space in a closely built-up neighborhood. If you prowl around the old streets near the Garden you will be touched to see how abutting apartments and houses have been designed (or remodeled) to catch the widest possible views of this surviving bit of the apothecaries' greenery.

Reading accounts of the famous botanists, gardeners, and explorers who have worked in or visited the Garden, gives one an insight into the history of studying and growing plants. In 1748 Peter Kalm, a student of Linnaeus who was on his way to collect specimens for his teacher in the wilderness of eastern North America, had to spend six months in London while he waited for a ship which would carry him to the New World. His description of the Physic Garden includes a fascinating bit of detail about pioneer attempts to grow tropical plants in northern lands.

> "In the largest orangery in Chelsea Garden the smoke [i.e., from the chimney of the heater] makes six bends in one of the long walls before it escapes."

Linnaeus himself had visited the Physic Garden twelve years before at the age of 29, the most serenely self-confident young botanist the world has ever seen. Time has shown that his estimates of his own ability were accurate, but the scholars who had been looking forward to his English visit were shocked by his immediate frankness about his own accomplishments. Sir Hans Sloane continued to think him personally beneath contempt for the rest of his life. Others, like Dillenius at Oxford, got over their annoyance at his self-esteem and became his champions.

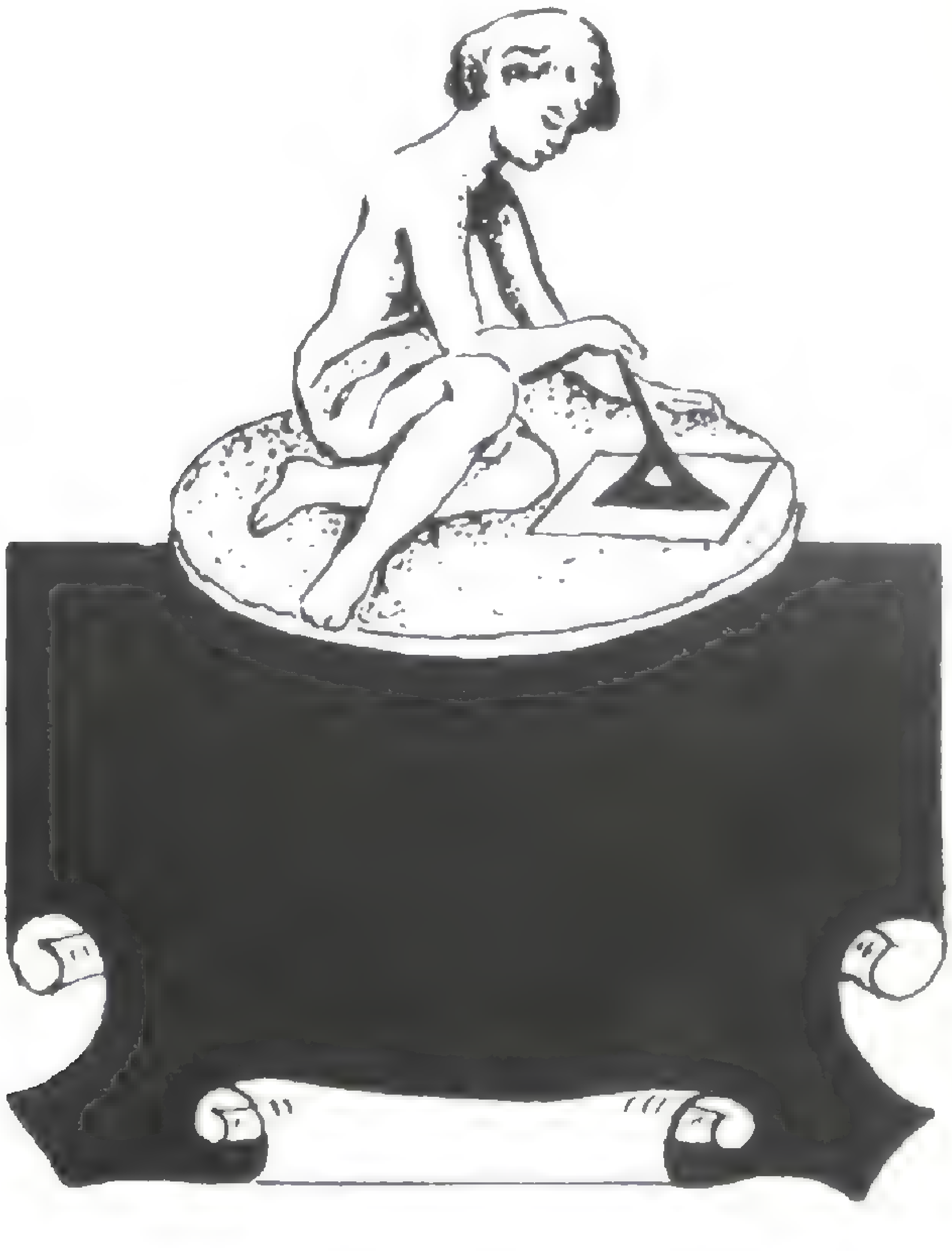
Linnaeus left a detailed account of one of these clashes, his meeting with Phillip Miller, then officially the "Gardener" of the Chelsea Physic Garden. Miller, a self-taught genius, was one of the most important figures in the early history of British Botany. Linnaeus' new system was rapidly bringing order out of confusion and Miller fell in line very shortly. Yet he and other Englishmen found it upsetting to carry on a conversation with the kind of man who in his autobiography wrote that his own powers of observation were among the greatest the world had ever seen and that no botanist or zoologist was greater than himself or so widely known.

A translation of Linnaeus' description of the meeting has been published by F. Dawtry Drewitt (Chapman and Dodd, 1924):

> When I paid Phillip Miller a visit, the principal object of my journey, he shewed me the Garden at Chelsea and named me the plants in the nomenclature then in use. * * * I held my tongue, which made him declare the next day, 'That Botanist of Clifford's does not know a single plant!' I heard this. I said to him as he was going to use names, 'Do not call plants thus; we have shorter and surer names.' Then he was angry and looked cross. I wished to have some plants for Clifford's garden, but when I came back to Millers he was in London. He returned in the evening. His ill humor had passed off. He promised to give me all I asked for. He kept his word, and I left for Oxford having sent a fine parcel to Clifford.

The old Garden that Linnaeus visited still has its excellent herb garden, actively used for instructing students in pharmacy, horticulture, and botany. An English landscape architect and writer, Margaret Brownlow, has caught a vision of how these same old herbs, "plaiting a fragrant cord," bind the centuries together and make us see the Apothecaries, the Herbalists, the succession of botanists and gardeners, the thousands of twentieth century London students:

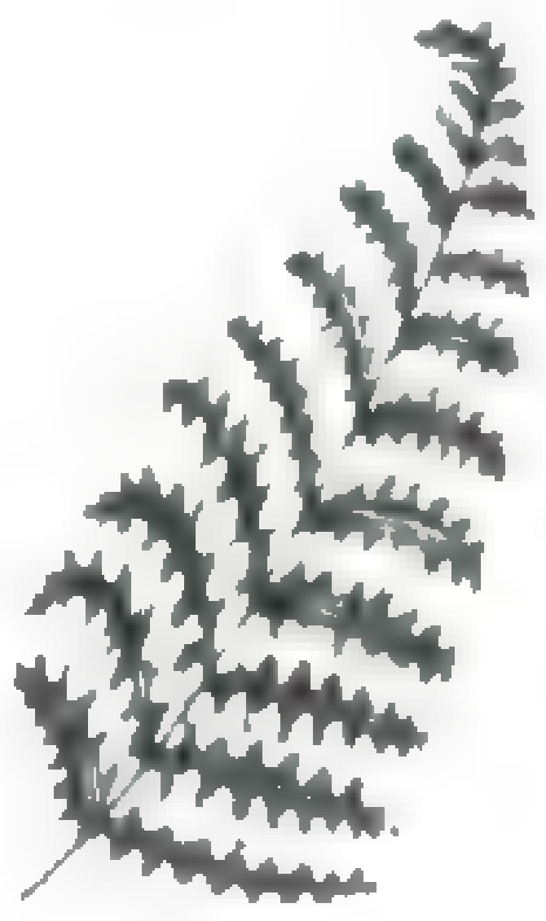
"**L**inked by this scented rope that binds the Centuries' fames
**L**asting or quietly faithful, holders of all we inherit,
**C**ome our own age's herb-savants, privileged in those they succeed."



Sketch of sundial in Herb Garden by Mrs. Rolla Horwitz.

# Ferns—Ferns—Ferns

HARDY FERNS for the garden, Ferns in the house, general Fern culture—maintenance of plants and raising them from spores will be the subject of the *Third Lecture* for *Friends Only*. This third in a series of five will be held Monday, April 18, at 10:30 A. M. in the Museum Building under the able direction of Dr. Derek Burch.



Something specific on ferns has been requested by many of the Friends and other patrons of Shaw's Garden. So here it is at last.

If you have not attended the previous two lectures, no matter. Put this down as a must—if you are a member in good standing of the Friends of the Garden. If not, re-activate your membership today by a quick phone call to Mrs. Leslie Gleason at the Friends Office—TOwnsend 5-0440. This is only one of the many free benefits you reap as a member of the *Friends of the Garden.*

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The Missouri Botanical Garden is a fund member of the Greater St. Louis Fund for Arts and Education.

# A FEW PRACTICAL POINTS ABOUT DRYING HERBS

HERBS can still be dried hanging in bunches in an attic, a spare room, or a tool shed. In modern homes there are usually more effective ways. The following is the most generally useful.

Set the oven on your stove at 150 to 200 degrees. When it reaches that temperature turn off the heat and put in the herbs. Ahead of time prepare cooky sheets or metal trays spread with paper toweling. Gather the herbs just before drying. Wash them well to remove dust and foreign matter. Work with one kind at a time; make your mixtures after they are dried. Pick off the leaves, buds, seed heads, small roots, depending upon where the flavor or scent is best and where it develops best under drying. Discard any diseased, yellowing, or over-mature portions. Discard any tough stems or leaf-stalks that can easily be removed at this stage. Lay the leaves out thinly and evenly but don't be too fussy; they shrink in drying.

Using the oven without further heat, leave the trays until cool or until the leaves are dry and crisp. Different kinds dry at different rates as do trays of the same kind picked at different maturities. If one session in the pre-heated oven isn't enough, repeat the process one or more times.

Crush the dried leaves as much as you prefer and store immediately in CLEAN, ODORLESS, tightly-stoppered bottles. Label *immediately* with name and date. You may find a small sieve useful in removing stems and larger fragments. Store out of direct light, as in a windowless cupboard.

One of the most generally useful condiments is made by drying the tough upper leaves of celery bought in the market. The green pascal varieties are good and are less apt to have most of the mature leaves removed than do the fully blanched varieties. You will find a good use for every bit you can dry.

# MISSOURI BOTANICAL GARDEN

# *Bulletin*

April 1966
Volume LIV
Number 4

COVER: *Veronica gentianoides* in Kenneth Peck's garden.

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# THE STORIES BEHIND TWO BOTANICAL NAMES

The botanical names given to plants and animals by Linnaeus frequently have a story behind them and sometimes it is an amusing one. By an odd chance two of these belong to genera which fall on successive pages in Gray's Manual, *Tillandsia* and *Commelina. Tillandsia,* the genus to which belongs the Spanish Moss, was supposed by Linnaeus, quite mistakenly as it happens, to prefer dry places. He accordingly dedicated it to a Swedish botanist of a previous generation whose dislike of water had become proverbial.

As a student setting out from Stockholm he had become so seasick that he made his return journey all around the Gulf of Bothnia for more than a thousand miles on foot. These were the days when Swedish scholars took on surnames for themselves and he adopted Tillands (by way of the land) as his. Actually Spanish Moss prefers moist air and is covered with scaly hairs which absorb water readily.

*Commelina* was the name chosen by Linnaeus for the bright blue Day-flower which has two large upright petals and one below, so small that it is almost invisible. There were three brothers Commelin, Dutch botanists, two of whom, Jan and Kaspar, turned out herbals. The third brother "died before accomplishing anything in Botany" and is supposedly represented by the tiny lower petal. E.A.

# ROCK GARDENS AND ROCK PLANTS FOR THE ST. LOUIS AREA

KENNETH O. PECK

## General Considerations

I can think of no other gardening activity as completely satisfying as rock gardening. Of all the forms that gardening assumes, rock gardening is perhaps the most challenging in the St. Louis area. The expression, "rock gardening," may be an unfortunate one in the minds of some people because it carries with it the misapplied connotations of requiring too much care coupled with an apparent lack of sophistication. This sounds harsh, but I believe it to be true. I further believe that many people are missing some of the richest experiences in gardening.

I view rock gardening as a release from the discipline of other accepted gardening procedures. The impelling thing to me about rock plants is the

Looking straight down on *Arenaria montana.*

imposing variety of species available above the plants commonly grown. Many of these are small in stature, completing their life histories (i.e., producing flowers and seed) while taking up less than a square foot of space, sometimes only a few square inches. On the other hand, shrubs and dwarf conifers may be used in rock gardens where space permits. Most of the plants grown by rock gardeners around the world are sun-loving plants, but the selection of a rock garden site should provide ample exposure to sun and shade as well. The emphasis of this article is placed on plants most suited to the small rock garden, but included in a later section is a list of plants for both small and large rock gardens.

Generally, in the St. Louis area, rock plants do best if the garden slopes gently to the north, sparing them the full intensity of the summer sun. The most difficult thing is the preparation of the new habitat consisting of rocks and soil mixture. Depending on the intended size of the rock garden, the bigger the rocks, the better. The minimal rock weight is considered to be 25 pounds. The rocks are actually functional in that they will provide a cool "root run" for the plants. This is only true, however, for rather large rocks which are 85% to 90% underground. There should be numerous "pockets" between and among the rocks as well as open places. Above all, the appearance of the rock garden should be as natural as possible. In

One of the "Mossy Saxifrages"

other words, your garden should not have the appearance of a rock quarry dump, nor should it be an exercise in symmetry. Also, rocks you use should be local in origin, all consisting of the same parent substance, i.e., limestone, sandstone, granite, etc. If you want to see a truly natural rock garden, just walk along the edges of bluffs over the Meramec or Mississippi Rivers to see numerous plants growing on the rocks, in crevices, and in loose mixtures of weathered rock and humus.

Ideal conditions for building a rock garden would be on an existing bank or slope. If you don't have this, it is possible to build one up. On the other hand, a rock garden may be built on flat ground in a raised bed enclosed by one or two tiers of railroad ties ("railway sleepers" in English books). Rocks may be used then for both functional and aesthetic reasons.

A mulch of gravel is often attractive and emphasizes the rock aspect of your garden. Such a mulch is best applied after placement of plants in the garden, helping to prevent surface soil compaction and splashing due to rain and watering. It also retards erosion by slowing water run-off. Be sure to use a mulch that is readily obtainable as it is necessary to replace a little each year.

Our continental climate is a major consideration and probably one good reason why more people do not attempt rock gardening in this area using the kinds of plants to be described. If we grow water lilies, dahlias, or chrysanthemums, our climate is good, but if we try to grow alpines like *Soldanella* (a primrose relative), *Eritrichium* (alpine forget-me-not), or *Dryas* (mountain dryad), we cannot bring them through the seedling stage of their life histories. I have taken the view that they should all be tried and that climate should be disregarded. The most difficult thing about our climate (aside from predicting the patterns that characterize it) is the very likely period of mid and late summer drought with high temperatures followed by low winter temperatures at a time when there is no snow cover. Warm, yes, hot summer nights also preclude the growth of many highly desirable rock plants. Some people disclaim the advantage of snow cover, but I lose more plants when there is not a good snow on the ground than when there is a cover.

### Obtaining Plants

The best way to obtain plants is to grow them from seed. Plants may also be purchased but seem not to fare as well as the same plants grown from seed. Besides, seeds are much less expensive and the plants they produce are a source of much greater satisfaction. Obtaining seeds can sometimes be a problem, and I shall list several good sources in a later section.

I prefer to sow all seeds in a cold frame in January and February, as my time permits. Many seeds need a period of exposure to cold, i.e. stratification, while others germinate freely indoors. In the cold frame, seeds germinate slowly, producing sturdy seedlings which never become leggy. The cold frame should face south. The sowing medium I like to use is vermiculite, either the horticultural or the plasterer's grade which is more finely granulated. Milled *Sphagnum* by itself or mixed with perlite is also satisfactory, and perhaps even better for seeds requiring more than one season to germinate. For sowing containers I use anything from a 4 inch plastic pot for a single species to a 14 by 20 inch flat for seeds of 30 species of plants. It is not essential that the cold frame be tightly closed. What is important, though, is that rain and droplets of water be kept from splashing seeds and sowing medium. A covering of snow, as and when supplied by nature, would be beneficial although not required. The seeds should be watered regularly and observed closely from time to time in the event that they should become uncovered by the watering process. Watering may be done with a sprinkling can equipped with a "rose." Animals, particularly cats and children who poke holes in the plastic-covered cold frames are thereafter the only real concerns until the seedlings are well on their way.

Seedlings may be transplanted as soon as they are large enough to handle in your fingers, taking the usual precautions to move intact plants with good root systems. Small wood or paper (waterproof and commercially available) 5 to 8 by 12 inches across and 2 to 3 inches deep are convenient for holding a dozen to 15 seedlings until they are ready for the nursery or garden.

A suitable soil mixture for transplanting consists of equal parts of soil, sand and brown peat or leaf mold.

This mixture is then diluted with a nearly equal amount of perlite. Plants that are not too vigorous may be kept in the same box throughout the growing season provided that they are given more room to grow in the fall.

Plants may be given a ½ to ¼ dilution of soluble fertilizer a few days after they have been transplanted and once again two weeks later with a full strength solution unless it is obvious that they are doing well enough without it. It seems that rock gardeners generally do not emphasize fertilizing plants or just don't do it at all. I have found, however, that it is helpful to get some plants growing vigorously before the nights are no longer cool.

### Soils and Planting

When starting in the rock garden venture, I decided to standardize most of my procedures. This has been particularly true with respect to the soil mixture used in the garden itself, although my mixtures have varied slightly in six years. When constructing the garden, the soil is basically a mixture of equal parts of soil, sand, and gravel, perhaps a little heavy on the gravel (torpedo or pea gravel) mixed a wheelbarrow full at a time. I use Meramec River gravel which is chert and has a very acid reaction. It is inexpensive and easily obtained. Following this, and prior to planting, I work in an amount of brown peat and perlite that would be equal to a 2 inch layer of each substance over all soil surfaces. This can be incorporated with a small shovel or hand trowel to produce a soil mixture that is ready to plant in.

Planting may be done any time from mid-March through early November with plants that have spent time either in a nursery bed or flats. In warm weather, early evening is peferred for planting, or a cloudy day, watering the plants in well. The most critical thing in rock gardening is soil drainage. While this is true in most gardening endeavors in the St. Louis area, I have found that plants will persist much longer and lead happier lives if planted in soil that is exceptionally well drained. How well drained *is* "well drained?" Take a hose running water at half pressure through a rose (i.e., perforated sprinkler) and water a 5 square foot area for 10 minutes. If no surface runoff occurs, you may assume your soil to be well drained. As important as good drainage, is the amount of organic matter in the soil. Since it is not practical to spade the soil in the style of garden being described here, the incorporation of organic matter (leaf mold or brown peat) is best accomplished by working it into the soil around the crowns of plants or by lifting the plants when dormant and working the organic matter into soil surrounding the ball of the plant.

Building and planting a rock garden may seem to be more trouble than preparing a perennial border, and it probably is. Obtaining and moving rocks into position is not always child's play. Mixing soil requires the incorporation of large amounts of sand and gravel. But it is only the initial work that is so great. A well constructed rock garden is an investment that pays dividends for years before it ever needs to be re-worked. Even then, reworking may reflect a change in taste.

### THE PLANTS

A gardener's preference for plants is a very personal matter to him. They are a reflection of his ideas and dreams, and form the substance of what he would like his garden to be. Added to this is his long or intensified experience with the plants that tempered his tastes.

No two gardeners will choose to grow an array of identical plant species. How dull this would be. We could never go to another's garden to see new plants if this were true.

The following lists include plants grown by three people. The first list was contributed by Dr. Frederick Comte who has been a rock gardener for years. The second is a combined list of plants grown by Mr. Harris Armstrong and me. The latter list will not be complete, since we both have plants which are yet to prove their merits for St. Louis rock gardens.

These lists contain an enviable variety of less common plants and will be useful to you in selecting plants for your own rock garden.

### ROCK PLANTS IN GARDEN OF DR. FREDERICK COMTE

*Abeliophyllum distichum*
*Adonis amurensis*
*Alyssum montanum*
*A. saxatile*
*Anchusa myosotidiflora*
*Anemone apennina*
*A. blanda*
*A. fulgens*
*A. japonica*
*A. nemerosa*
*A. patens*
*A. pulsatilla*
*Anemonella thalictroides*
*Aquilegia chrysantha*
*A. coerulea*
*A. sarmosa*
*Arabis alpina*
*Aubrieta deltoides*
*Bouteloua gracilis*
*Campanula carpatica*
*C. garganica*
*C. persicifolia*
*C. portenschlagiana*
*Centranthus ruber*
*Cerastium tomentosum*
*Ceratostigma plumbaginoides*
*Cheiranthus cheiri*
*Chionodoxa luciliae*
*C. sardensis*
*Colchicum autumnale*
*Collinsia verna*
*Cotoneaster horizontalis*
*Crocus aureus*
*C. chrysanthus*
*C. imperati*
*C. medius*
*C. sativus*
*C. speciosus*
*C. susianus*
*C. tomasinianus*
*C. vernus*
*C. zonatus*
*Cyclamen europeum*
*C. hederaefolium*
*Cymbalaria muralis*
*Cypripedium parviflorum*
*Delphinum ajacis*
*D. tricorne*
*Dianthus alpinus*
*D. arenarius*
*D. caesius*
*D. deltoides*

*D. knappii*
*D. plumarius*
*D. superbus*
*Dicentra canadensis*
*D. cucullaria*
*D. eximia*
*D. spectabilis*
*Dodecatheon meadia*
*Epimedium alpinum*
*E. macranthum* and varieties
*E. pinnatum*
*Erythronium albidum*
*Eranthis cilicica*
*E. hyemalis*
*Erigenia bulbosa*
*Erigeron speciosus*
*Erinus alpinus*
*Eriogonum flavum*
*Galanthus elwesii*
*G. nivalis*
*Helianthemum vulgare*
*Helleborus niger*
*Hemerocallis flava*
*Hepatica acutiloba*
*Hepatica triloba (nobilis)*
*Heuchera sanguinea*
*Hieracium murorum*
*Hosta plantaginea*
*Hypoxis hirsuta villossissima*
*Iberis sempervirens*
*Inula ensifolia*
*Iris cristata*
*I. danfordiae*
*I. lutescens*
*I. pumila*
*I. reticulata*
*I. siberica*
*Isopyrum biternatum*
*Jasminum nudiflorum*
*Krigia biflora*
*Leucojum aestivum*
*L. vernum*
*Liriope graminifolia*
*Lithospermum canescens*
*Lobelia cardinalis*
*Lychnis alba*
*L. dioica*
*L. flos-javis*
*L. viscaria*
*Lysimachia nummularia*
*Mahonia repens*
*Mazus japonicus*
*Mertensia virginica*
*Milla uniflora*
*Narcissus jonquilla*
*N. King Alfred*
*N. poeticus*
*N. triandrus*
*Nigella damascena*
*Oenothera grandiflora*
*O. missouriensis*
*O. speciosa*
*O. tetragona* varieties
*Omphalodes cappadocica*
*O. linifolia*
*Oxalis bowiei*
*O. violacea*
*Papaver atlanticum*
*P. nudicaule*
*Penstemon arkansanus*
*P. digitalis*
*P. grandiflorus*
*P. tubieflorus*
*Phlox divaricata*
*P. paniculata*
*P. pilosa*
*P. subulata*
*P. suffruticosa*
*Physostegia virginiana*
*Potentilla fruticosa*
*Primula elatior*
*P. officinalis*
*P. polyanthus*
*P. sieboldii*
*P. vulgaris*
*Pulmonaria angustifolia*
*P. officinalis*
*Puschkinia scilloides*
*Rehmannia angulata*
*Salvia azurea*
*S. pratensis*
*Sanguinaria canadensis*
*Schivereckia podolica*
*Scilla biflora*
*S. hispanica*
*S. nutans*
*S. sibirica*
*Sedum acre*
*S. kamtschaticum*
*S. nevii*
*S. ochroleucum*
*S. sarmentosum*

*Aquilegia scopulorum* of Colorado peeking out from under a rock.

*S. sieboldii*
*S. spectabile*
*S. ternatum*
*Senecio aureus*
*Silene armeria*
*S. maritima*
*S. stellata*
*S. virginica*
*Sisyrinchium albidum*
*Spigelia marylandica*
*Thermopsis pinetorum*
*Thymus lanuginosus*
*T. serpyllum*
*T. vulgaris*
*Tiarella cordifolia*
*Trillium grandiflorum*
*T. recurvatum*
*Tulipa sylvestris*
*Uvularia grandiflora*
*Verbena canadensis*
*Veronica prostrata*
*V. teucrium*
*Viola odorata*
*V. papillonacea alba*
*V. pedata*
*V. sororia*
*V. striata*
*Xanthisma texanum*

* * *

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*Campanula cochlearifolia* in Webster Groves.

## List of Plants Grown by Harris Armstrong and Kenneth Peck

*Acaena microphylla*
*Achillea tomentosa aurea*
*Aethionema pulchellum*
*A. schistosum*
*Alyssum montanum*
*A. saxatile compactum*
*Anemone sylvestris*
*Antennaria dioica*
*Antirrhinum asarina*
*Aquilegia akitensis*
*A. alpina*
*A. glandulosa vera*
*A. scopulorum*
*A. viridiflora*
*Arenaria montana*
*Armeria caespitosa*
*Astilbe* "Gnome"
*Aubrieta* — several species
*Calamintha alpina*
*Campanula carpatica*
*C. carpartica Convexity*
*C. carpatica turbinata*
*C. cochlearifolia (pusilla)*
*C. elatines glabra*
*C. garganica*
*C. petiolata*
*C. poscharskyana*
*C. raddeana*
*Carlina acaulis*
*Cerastium tomentosum*
*Chieranthus linifolius*
*Cymbalaria (Linaria) muralis*
*Dianthus alwoodii alpinus*
*Dianthus deltoides*
*D. neglectus*
*D. plumarius*
*Draba aizoides*
*D. cuneifolia*
*D. pyrenaica*
*Erigeron compositus*
*E. scribneri*
*E. specious*

*Erinus alpinus*
*E. alpinus* Dr. Hanelle
*Gentiana lagodechiana*
*G. septemfida*
*Geum borisii*
*G. triflorum*
*Gypsophila repens rosea*
*Hutchinsia alpina*
*Ionopsidium acaule*
*Jasione jankae*
*J. perennis*
*Leontopodium alpinum*
*Lesquerella spatulatum*
*Linaria alpina*
*Linum flavum compactum*
*Lychnis alpina*
*L. haageana*
*Mazus japonicus*
*Oenothera fremontii*
*O. triloba*
*Papaver pyrenaicum rhaeticum*
*Penstemon albertinus*
*P. glabrescens*
*Phyteuma hemisphaericum*
*Potentilla aurea*
*Primula vulgaris*
*Sagina pilifera*
*S. subulata*
*Saponaria ocymoides*
*Saxifraga* — mossy varieties
*Scabiosa columbiana*
*S. silenifolia*
*Sedum caeruleum*
*S. nevii*
*S. stenopetalum*
*Silene alpestris*
*S. schafta*
*S. rupestris pygmaea*
*S. wherryi*
*Statice peticula*
*Talinum*
*Thalictrum minus adiantifolium*
*Townsendia exscapa*
*T. hookeri*
*T. parryi*
*Tunica saxifraga*
*Veronica gentianoides*
*V. repens*
*Viola jooi*

## ADJUSTING PLANTS TO ST. LOUIS CLIMATE

ELEANOR B. McCLURE

The difficulties of gardening in the St. Louis area have provoked enough maledictions to jam the air waves. It does take pampering to keep some plants happy when "normal" weather offers a veritable grab bag of heat and cold, deluge and drought. Bitter cold snaps seldom last long, but this may add to the problem. Plants can get badly confused when any midwinter day may offer simultaneous samples of June and January.

Despite this handicap, more and more gardeners are proving that it is possible to grow a wide variety of plants here—if you just know how. We can't grow all of the northern plants, but many St. Louisans are succeeding with southern trees and evergreens that are not supposed to be hardy to our climate (Zone 5)—evergreen magnolias, Chinese and Japanese hollies, and *Nandina domestica,* to name a few.

So little is known about plant hardiness that it is difficult to make hard and fast pronouncements. Moreover, there seem to be surprising variations in the tolerance exhibited by a single species. I remember, for example, the giant rhododendron that grew smack in front of a house in Webster Groves. It was planted in a poor bed, had a trying southern exposure, and apparently lacked even routine care. Yet this plant grew and thrived for many years.

My own experience has convinced me that many southern evergreens may grow well here if they can get through the first three or four winters with minimum damage. A number of small cuttings of *Ilex cornuta*, brought from the Harris garden in Cape Girardeau many years ago, enjoyed several "Tennessee winters" in their early years and thus had a chance to develop a robust, deep-foraging root system. Since that time they have endured severe subzero temperatures without a sign of leaf burn.

On the other hand, I have often noticed that a southern holly or magnolia may not make a complete recovery from a severe injury that occurs during the first year or two after being planted. It is possible that loss of many branches has been accompanied by root damage as well. At any rate, if there has been extensive die-back, these plants often go into a decline, looking worse each year until they are eventually discarded.

If southern evergreens can be successfully established, however, they may become more reliable than such cold-tolerant species as white birches *(Betula papyrifera)*, mountain ash, Canadian hemlocks, and mountain laurel. Those big hybrid delphiniums seem to resent hot, dry summers, and so do lupines. In fact, you need only to go to the vicinity of Rockford, in northern Illinois, to see that even our common annuals appreciate cooler night temperatures. In that area geraniums, petunias, snapdragons, and other bedding plants make sturdy growth, and they bloom prolifically. The coloring of the flowers is intensified as well.

In considering the hardiness of plants in our gardens, it is well to remember that some sections of Metropolitan St. Louis vary more in soil and climate than do, say, New York and Philadelphia. For example, I have found such tender hollies as *Ilex* "East Palatka" and *Ilex cornuta* thriving in a South Broadway garden, where they enjoy fertile loamy soil and milder winter temperatures. In contrast, even the rugged American holly *(Ilex opaca)* may suffer damage in windswept gardens in Creve Coeur or in a bluff-top garden near Old Jamestown Road, in the northern part of the county.

There also may be variations of from ten to fifteen degrees between different areas in your own garden. By taking note of these "microclimates" you may be able to give each flower, tree or evergreen a more favorable planting spot.

It has been interesting to see how well plants respond to the microclimates in my own garden. American hollies and pyracanthas that are growing in partial shade are not as robust as those planted against a brick wall with a southern exposure. These toughies enjoy ample sunlight and are not discouraged even by heat reflected from the wall.

On the other hand, many rather miffy broadleaved evergreens flourish in our small woodland garden, a densely shaded area with the additional protection of a northern slope. Here leucothoe grows happily, and many varieties of rhododendrons and azaleas are so big and buxom that it is difficult to walk between the plants.

While *Pieris japonica* may enjoy a

sunny spot, most of the acid-loving broadleafs prefer at least partial shade. They are usually quite at home in a foundation planting that has a northern or eastern exposure, or when planted beneath the sheltering branches of oak trees. Special soil preparation is needed, however, for these plants should have an organic-rich, well-drained bed, fertilized with an azalea-camellia fertilizer.

Since winter burn usually results from desiccation caused by winter sun and drying winds, it might seem advisable to provide shaded areas for Chinese and Japanese hollies. However, I have found that these plants often suffer several injuries when planted in deep shade on the north side of a building or beneath elm or maple trees. An educated guess is that the southern hollies also need ample sunlight if they are to have full strength and vigor. I am no longer planting Japanese hollies in these problem spots, but have been substituting yews, boxwoods or inkberries *(Ilex glabra)*.

When tender hollies are planted in the open, they sometimes suffer a winter burn that gives the plants a harlequin look, with nice green leaves on one side and severe burn and browning of foliage in the area exposed to the late afternoon sun. In one grouping of three large evergreen magnolias, I have been able to trace the pattern of sun and shade by noting the foliage burn on the tree that is planted farthest from an east wall and hence has least protection.

In the same garden a row of East Palatka hollies was planted along an ell of the house. Thus protected from both south and west, these hollies grow more handsome year by year and suffer a minimum of winter damage.

Incidentally, a possible explanation of winter damage done to just one side of a plant may be found in experiments made at the University of Minnesota, where it was disclosed that low temperatures alone were not as injurious as a sharp chilling that occurs in a very short time. Thus the portion of an evergreen that is exposed to the late afternoon sun may bask in temperatures as high as 50 or 60 degrees. Then, with the setting of the sun, the mercury may plunge to sub-freezing, and the tender foliage is subjected to a severe burn.

If you aspire to grow these handsome but somewhat difficult southern evergreens, it is advisable to provide some protection during the first two or three winters. In one St. Louis County garden burlap screens have been very helpful. Another planting of *Ilex crenata rotundifolia* has been protected with sections of snow fencing. These devices are not decorative in the winter garden, but there is a chance that they will not be needed after the first two or three years. An oak tree will give dappled shade even in winter, when the branches are bare. A screen planting of densely branched crabs can be helpful, but a hedge of pines or American hollies, trimmed to make a wall of green, would be even more effective.

There is a good possibility, too, that we can increase the hardiness of our evergreens by giving them the best possible growing conditions. The starting point: plant them in organic-rich soil. Experiments at the University of

Missouri proved that there was less winterkill of perennial rye when it was grown in fertile fields. A partial explanation was that well-fed plants had a higher protein content, and the tissues were more resistant to freezes.

Although the soils in different parts of the Metropolitan area vary widely, all can be improved so that they make an excellent plant bed. Some fortunate gardeners on the south bank of the Missouri River and on the east side of the Mississippi are working with a loess soil, a rich loam which was probably blown there from river flats in ages past. Loess soil is very fine and tends to pack hard, so that it may have the consistency of a road bed by midsummer. Add an abundance of organic matter, though, and it is one of the most productive of soils.

Organic matter is even more essential in the many areas of St. Louis County that are part of the Ozark Plateau. Years ago this stubborn clay was mined by the pioneers to make bricks for their houses. Fortunately, even clay soil is far from hopeless.

Our system is to improve the surface soil, for the deep digging and trenching so often recommended in garden books just results in making a sump hole. We start by digging or plowing the top foot or so of soil. Then the entire surface of the bed is covered with two-inch layers of peat moss and perlite. A rather heavy application of fertilizer (about 6 pounds per 100 square feet) is sprinkled on top. For most plants we use a balanced chemical fertilizer, but a special azalea-camellia fertilizer must be used for acid-loving evergreens.

When we encounter hardpan clay, we often haul off part of the soil, replacing it with more peat and perlite, along with compost, manure, rotted sawdust or other available organic matter. The completed bed should be very light and airy, with the surface about three or four inches above surrounding soil. This usually provides the excellent surface drainage needed for broad-leaved evergreens.

Winter burn is usually greater when plants are cut back and trimmed severely. The plants of an Ilex hedge are more susceptible to damage when they are given a flat, crew-cut trim. If possible, they should be allowed to grow more naturally, without close trimming and shearing.

Regular feeding is most helpful, too. Our practice is to use two rather light fertilizer applications, one in mid-March and one towards the end of June.

Use of organic mulches helps maintain the desired high humus content in an evergreen bed. A good summer mulch helps assure an ample supply of moisture during drought and reduces soil temperatures. Compaction of the soil is largely eliminated, so that the roots enjoy an abundant oxygen supply, and often form dense mats of feeder roots in the mulch itself.

An organic mulch is very beneficial in the winter too, for it helps prevent deep freezing of the soil, allowing some portion of the root system to function at a time when the surface soil is frozen. The mulched plants are also protected from the alternate freezes and thaws of early spring.

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Mr. and Mrs. M. I. Zorensky

## SPRINGTIME GREENS FROM SQUARE-STEM

Mrs. Chester Pohle, one of the volunteer hostesses at Tower Grove House, has called to our attention the outstanding merits of young leaves of our native square-stem, *Silphium perfoliatum*, as a green vegetable in early spring. Mrs. Pohle grew up just south of Jefferson City near the town of Henley, mentioned in the Shaw House Cook Book as the site of a hotel patronized by Mr. Shaw and famous for its hearty and delicious food. She tells us that through that part of the Ozarks these greens are popular (she for instance prefers them to spinach) and that traditionally they are cooked with a little salt-bacon or salt-pork to add to the flavor.

As more people learn about it, this dish should become popular in Missouri, for *Silphium perfoliatum* is found throughout the state except in the four extreme "swamp-east" counties. It is difficult to confuse with any other plant for its tall stout stems, which die down to the roots every winter, are almost as square as if they had been manufactured on a machine. Their leaves are borne in pairs on the upper part of the plant; the two members of each pair are fused so completely together that they can hold water, and the species is most widely known as "Cup Plant," though it has fanciful common names such as "Carpenter's Square."

Square-stem grows in creek bottoms, around the margins of small ponds, along the sunny borders of lowland woods, and such-like places. When the weather gets warm it shoots up rapidly and becomes from waist high to well over one's head. The pale yellow flowers, looking something like a small sunflower or a juicier coreopsis, are borne in loose panicles at the top of the plant. They are almost good-looking enough to include in a perennial garden but would probably be a nuisance by spreading too actively from their roots. Sometimes one will see a long line of them along a fence or the front of a woodland which have evidently spread in this way and when they are in flower they make a noticeable streak of pale yellow in the summer landscape.

This habit of occurring in big clumps makes them a reliable source for a good-sized mess of greens. They are used only in the springtime when the leaves come up ahead of the stem. If one picks the first leaf when it is three inches or less high, one can come back again and pick the second leaves, and come even again for the third leaves.

One uses just these bright green new leaves with no stem or stalk, washes them well, pouring off the water and boiling them in fresh water with small pieces of salt-bacon or salt-pork for flavoring. It will take about an hour's gentle cooking to get them ready for the table.

Because they can sometimes be found in such large clumps, Mrs. Pohle has found it practical to gather them in quantity and freeze them to use later in the year. She cooks them in plain water without salt or bacon until they are done (not merely blanched) then drains and freezes them. In using these frozen square-stem greens she adds cut-up bacon and cooks them till the flavors blend.

EDGAR ANDERSON

* * *

## SPRING PLANTING IN OUR HERB GARDEN

As THIS number was going through the press, the members of the St. Louis Herb Society were out in back of TOWER GROVE, tidying their herb garden up after the winter and busier than ever-before with their spring planting. These extra efforts this year are because of plans for their part in the Harvest Show next September. They are going to have a "Sidewalk-Market Sale" of their own herbs and herb products. There will be freshly dried herbs, herb vinegars, seasoning salt, their own curry powders, pickles, chutneys of several kinds, herb jellies and a bottled mint sauce for lamb and other meats. To make this possible every inch of the herb garden will have to be in full production this year.

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The Missouri Botanical Garden is a fund member of the Greater St. Louis Fund for Arts and Education.

# AN APPEAL

The Missouri Botanical Garden urgently needs private and public support. **Nearly half the annual operating cost must come from funds outside the institution.** Private donations assist enormously our ability to teach about plants and to display plants to a vast public audience. Individuals may assist by making a direct contribution, by taking a membership in the Friends of the Garden, by endowments, or through the Tribute Fund. Every citizen of St. Louis and environs should share an interest in this remarkable institution.

The herbarium needs direct support to properly maintain and work with these great collections. Financial assistance is needed to carry through the mounting and storage of specimens, to afford exchange of specimens with the other great collections of the world, and to further the search for new varieties. The herbarium collection of preserved plants is the third largest single collection of the Western Hemisphere and contains collections from nearly every great exploration of the American West. Recently we located a specimen collected by Charles Darwin during the voyage of the "Beagle" in 1834. To study plant evolution, plant genetics, or plant geography, scientists throughout the world visit the Missouri Botanical Garden. The plant collections represent for future generations a permanent record of the world of plants before, during, and after man has disrupted the face of the Earth. New explorations for plant species will continue as the staff of the Garden travels tropics, tundras, deserts, and forests in all segments of the globe.

To restore the badly deteriorated volumes of the library to permanency and usefulness will require a long term expenditure of more than $400,000. The 65,000 volumes and 100,000 separates cover five centuries of botanical publication. **The entire history of plants and man is found in this library, valued at over $2,000,000 and ranking among the top six of the Western Hemisphere.**

The Garden needs support to improve outmoded facilities such as boilers, plumbing, wiring, equipment, and greenhouses which require replacement in the immediate future.

***PLEASE HELP US!***

# MISSOURI BOTANICAL GARDEN

# Bulletin

May 1966
Volume LIV
Number 5

ROSE GARDENS, NEW ROSES, OLD ROSES

1889

COVER: APRICOT NECTAR. One of three varieties to win ALL AMERICA honors for 1966. It is a floribunda with fragrant large blooms of clear apricot.

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Missouri Botanical Garden Bulletin

Vol. LIV No. 5 May 1966

# ROSES FOR THE AVERAGE GARDENER

ELEANOR B. McCLURE

It's high time to dispel the hoary old idea that roses are difficult plants, and that a rose garden demands a great deal of care. Nothing could be further from the truth, for, with proper planning and planting, a rose garden actually needs a minimum of upkeep.

Let me say at once that the rose garden which I envision is quite different from the typical "Rosarian's Garden." The true rose hobbyist likes to display a sort of catalogue of roses. His aim is to have a collection of many different varieties and to get maximum performance from the ones that are most difficult to grow. And in consequence, his garden may exemplify a sort of horticultural "Parkinson's Law," in that "the care of the roses tends to expand to fill all the time that can be allotted to them."

Our aim, on the other hand, is to avoid "collections," selecting varieties that will provide maximum bloom with minimum care. This means eliminating "miffy" roses in favor of sturdy and floriferous varieties notable for giving a fine performance year after year.

In making this list we can consult the excellent "Guide for Buying Roses," published annually by the American Rose Society. Both old and new roses are rated numerically. Those with numbers ranging from 9.9 to 9.0 can be considered "outstanding," and those from 8.9 to 8.0 are "excellent."

It is interesting to note that many of the "new roses" and All-America roses that are introduced with such fanfare each year tend to plummet to lower ratings after a season or two. For example, Kordes Perfecta, John Armstrong, Pink Peace, Pink Parfait and Garden Party are all rated between 7.0 and 7.9. Although this entitles them to a "good" classification, we must not expect these roses to be as effective in the garden as such reliables as Tiffany, Helen Traubel, Queen Elizabeth, Montezuma, Tropicana, or Carrousel.

Among other undemanding roses that make a fine display are Charlotte Armstrong, Chrysler Imperial, and Crimson Glory. Although the famed Peace rose has the highest rating of all (9.6), we have found the plants quite variable. At its best it is truly magnificent, but when used in a mass planting it is apt to be disappointing.

When mass color is needed (and the size of the flowers is not important) many floribunda roses can be recommended. This year I plan to try the 1966 All-America winner, Apricot Nectar, for its record seems promising. Among the floribundas we have grown and liked for many years are Fashion, Spartan, Frensham, Red Pinocchio, Pink Bountiful, Circus, and the Farmer's Wife (even though the last two varieties have only a 7.8 rating).

Some husky, shrubby roses can be used for flowering hedges, and they bloom so profusely that they make a fine splash of color. Among the best of these are three old favorites: Else Poulsen, Donald Prior, and Betty Prior. The single or semi-double blooms of these roses are better for garden display than for picking.

All of these vigorous roses will fill our first need: to have plants that thrive with a minimum of pampering. The next step in reducing maintenance is to design a garden that will look neat and attractive without a great deal of routine work.

Fortunately, we are now much less influenced by memories of Grandma's old-fashioned rose garden. Victorian gardens, like the homes of that era, were cut up and divided into many small areas. The rose garden, as a rule, was enclosed with walls or hedges and often located at some distance from the house. Small beds, separated by grass paths, were planned to make a decorative over-all pattern.

While it is true that gardens of this type do have an appealing old-fashioned charm, they also demand a great deal of care. It is hard to maintain grass paths, and much time is needed to keep the beds properly edged and weeded. Then, too, why should roses be exiled in a distant spot where the blooms can rarely be seen?

A much better solution is to make the beds a part of a terrace or patio garden. Here the flowers may be enjoyed both from outdoor living areas and from adjacent rooms of the house. And happily, maintenance can be kept at a minimum. The laborious task of edging beds is eliminated, and the likelihood of weed invasions is greatly reduced. Moreover, the paving makes a good walking surface, so that it is easy to care for the roses or to pick them, even in bad weather.

It is necessary, of course, to select an open, sunny area, for roses will not bloom well in the shade or in a spot where they must compete with the roots of trees. If the beds are used as a border for one or two sides of the terrace, they should be shaped to follow the outlines of the paving.

For best effect, use two or three rows of roses, with plants "staggered" for proper spacing. There should be a permanent edging of brick, stone or railroad ties, depending on materials used in the rest of the terrace. The edging not only enhances the over-all effect, but it also helps retain soil and mulches and keeps them from washing onto the terrace floor.

To enhance the color of the blooms —and for improved winter effect—a hedge of yews or euonymus can be used as a background for the roses. Since a rosebush is not always the most decorative of plants, I often add a foreground planting as well.

Either Korean boxwoods or the dwarf Euonymus, JEWEL, can be trimmed to make tidy green curbs. Both are very hardy, easy-grow plants. Chinese privet can also be used as a dwarf hedge, provided that the plants

MATTERHORN, an ALL AMERICA selection for 1966. As the picture suggests, this hybrid tea rose has blooms which are effective in flower arrangements. The flowers are white with a suggestion of yellow at the base of the petals.

are cut back when set out and are never allowed to get out of hand.

If summer color is more important than winter effect, substitute flower edgings for the hedges. To intensify the coloring of a bed of pink roses, edge it with a row of pink geraniums. White lantana, blue plumbago, white vinca, or pink or white cascade petunias make gay borders, although these plants should be trimmed from time to time, to encourage compact growth. For a low ribbon of bloom, interplant white and lavender alyssum.

If the terrace or patio is very large, it is sometimes possible to develop a patterned rose garden, with sections of paving omitted to allow space for the flower beds. A rose garden of this type is usually symmetrical, with beds placed to form a rectangular or circular pattern.

While this plan may look most attractive on paper, it is rarely as satisfactory as a border planting. Very often the beds are too narrow to grow roses well, and there is no room for background plantings or edgings. When beds are constructed as islands in the paving, the flowers may be subjected to too much reflected heat. The plants tend to dry out very quickly, and it is difficult to water the roses without washing dirt over the paving. Unless a drainage system is installed when the beds are built, they may become waterlogged during periods of heavy rains.

The final prerequisite for an "easy-care" rose garden: proper planting. First of all, buy the best quality plants. It is too late to set out bare root roses this year, for they are best planted in very early spring. Fortunately, good potted roses are now widely available. Be sure to buy them from a reliable grower who retains most of the root system. I have seen dead roses that had pitiful stumps for roots, the poor plants having been whacked unmercifully because it was then easier to fit them into pots. When a large root is cut back too far, it cannot develop new feeder roots.

Before planting, the bed should be enriched with liberal quantities of organic matter—compost, rotten manure, and peat moss are all helpful. We like to add perlite for improved aeration. About 6 pounds of a balanced chemical fertilizer may be used per 100 square feet of bed, along with a pound or two of superphosphate. All of these materials should be worked thoroughly into the top foot or so of soil.

When planting the rose, be sure that the bud union (the thickened part of the lower stem) is about even with the surrounding ground. Water well to settle the soil, and level the surface of the bed.

Then, for a real work-saver, mulch the bed with about two inches of rotted sawdust, chopped corn cobs, cocoa bean hulls, pecan hulls or similar material. This protective layer eliminates the need for cultivating the bed and reduces weed infestation. The mulch keeps the roots cooler in summer and also conserves moisture.

Roses should be fed lightly about once a month until mid-July. Water your plants infrequently but thoroughly during periods of drouth, but complete the irrigation early in the day, so

(Continued on Page 7)

The Garden's Rosarian, Francis R. McMath (at the right) receiving a bronze plaque from John A. Armstrong, Jr., in appreciation of his long service as a Judge for the All American Rose Selections at their 25th Anniversary celebration last year. Though he comes from a St. Louis family with a gardening tradition, Mr. McMath was not an enthusiastic gardener until he had a home of his own. Then he rapidly became one of the city's outstanding gardeners. Part of this is due to his sister, Miss Virginia McMath, a well-known landscape architect. Much of it was the result of his sound university training as an engineer. Before rose judging, rose testing, and rose growing were developed to their present high level he was not only growing many roses at his own home, he was keeping complete and accurate records of their month by month and year to year behavior. He has contributed to the "Proof of the Pudding" rating in the American Rose Society Annual for 34 years and has judged roses from Portland, Oregon, to Syracuse, New York, and from Minneapolis to Tyler, Texas. Part of his great reputation as a judge results from his natural dignity, his impressive height, and his clear decisive voice.

He has been outstandingly generous in advising others both in St. Louis and nationally. He has served for 8 years on the KFUO Radio garden program. He has been a leader in Men's Garden Clubs. He has helped Mr. and Mrs. John S. Lehmann develop our new rose garden into one of national signifi-

(Continued Bottom Page 6)

The four All-American winners for 1967. They have already been moved out of the test garden and will be on display all summer in the new rose garden near Mr. Shaw's old country home, Tower Grove.

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(Continued from Page 5)

cance. With other enthusiastic members of our local Rose Society he is now busy with plans for making this garden a center for helping other gardeners with advice and demonstrations on special Rose Days.

E.A.

(Continued from Page 4)

that leaves have a chance to dry out before nightfall.

Proper watering and use of a good mulch combine to help prevent the spread of soil-borne fungus diseases. Nevertheless, all plants should be protected with a good three-in-one spray or dust—preferably applied once a week. Although sprays are somewhat more effective, dusts can be applied with greater ease. An efficient crank-type duster is a good investment. With this handy gadget, it takes just a few minutes to protect a large planting of roses.

## ALL AMERICAN ROSE SELECTION TEST GARDEN

It is a little known fact that the "Garden" is the site of one of the 24 All America Rose test gardens.

In 1962 Mr. John S. Lehmann (one of the Garden's trustees) and his wife, both very much interested in roses, asked the writer to try to increase the image and prestige of the Garden by securing an A.A.R.S. test garden. By contacting our various commercial rose friends and with the assistance of Mr. Robert Waln (former member and chairman of the Horticultural Advisory Council of the Garden) now living in the East, we secured tentative approval. This brought an inspection by the late Mr. Ralph Dasher, then Secretary-Treasurer of A.A.R.S. His favorable report was followed by the approval of the A.A.R.S. Committee. This made us a demonstration garden in 1963 with the writer as supervisor. Having passed the one year trial period, in 1964 we became a full fledged official test garden with the writer the official judge.

The non-profit All American Rose Selections, organized in 1938 by the nation's major commercial rose growers and introducers of new varieties, is dedicated to the improvement of roses for the gardening public. Through its system it has provided the home gardener with a yardstick for choosing rose plants that have proved their performances. By its uncompromising standards it has established a goal for breeders; to develop better growing varieties with merits that meet the world's most stringent testing program. An A.A.R.S. citation for his creation is the rose hybridist's most sought-after prize.

New roses developed by the hybridists the world over are tested by A.A.R.S. for superiority in Vigor; Habit; Hardiness; Disease Resistance; Foliage; Flower Production; Bud and Flower Form; Opening and Finishing Color; Fragrance; Stem; and Novelty. All entries are evaluated on these important characteristics—the qualities that reflect themselves in roses of vigor, hardiness, and flowering beauty for your garden.

Only a truly outstanding rose can meet the demands of this grueling test. Those few to achieve the highest scores are awarded the singular honor . . . ALL AMERICAN ROSE

An All American Rose Selections

Award is the highest honor a rose can earn. To the amateur gardener it represents an unprecedented assurance of quality and growing satisfaction in his garden. An A.A.R.S. winner comes to you with an endorsement from the entire industry. A testimonial that says, "This is truly one of the finest roses in the world."

The All American Rose Selections in 1965 celebrated their 25th Anniversary and as a token of appreciation to their judges awarded to each a bronze plaque "In recognition and appreciation of outstanding service in the judging of roses." The writer was the recipient of one of these awards.

The 1967 winners of the All American award will be the first such of those grown and judged at the Garden.

They are a pink hybrid tea by Germain's, "63 R 09," a pink bicolor grandiflora by Armstrongs, "63 R 48," a pink florabunda by Jackson & Perkins, "63 R 71" and a red multicolor florabunda by Howard of Hemet "63 R 83."

Anyone desiring an All American Rose Selection booklet giving all the A.A.R.S. winners together with cultural information may obtain them by sending a stamped, addressed envelope to the writer.

Frank R. McMath

1316 Cheshire Lane
Webster Groves, Mo. 63119

## WHY ASPEN LEAVES FLUTTER IN THE WIND

If you will look closely at an aspen leaf you will find the mechanism which is responsible for its incessant movements and for their peculiar rhythm. The leaf stems of all poplars are somewhat flattened sideways; those of the aspens are very flat indeed. The flattening goes right up to the blade of the leaf where the two flattened surfaces, the blade and the leaf stem, meet each other at right angles. If you will take a twig of aspen and hold it in your hand and blow gently on the leaves you can see for yourself the way in which the slightest breath of air, meeting the blade, is instantly translated into a shilly-shallying sideways motion. E.A.

## OIL OF BROOMSEDGE

The Broomsedge, *Andropogon virginicus*, covers old fields and pastures in Missouri with masses of russet brown. It adds color to our landscapes and makes an excellent shelter for quail but it is our worst fire hazard. If you would like to know just how inflammable it is, gather a small tuft of it, lay it out in the middle of the roadway, and light it with a match. It burns almost as if it had been soaked in oil. A single stalk of it can carry the flame from one clump to another. This is not surprising if one realizes that geranium oil, oil of citronilla, and lemon grass oil are all distilled from coarse tropical grasses which are related to our broomsedge.

E.A.

* * *

## ANSWERS TO TOUGH PROBLEMS

EDGAR ANDERSON

Before Mrs. McClure's effective summary of her experience in helping people with roses came to my desk, I made several attempts to find out what old or new varieties of roses are most satisfactory for our difficult climate and stubborn soils. I finally set up three hypothetical problems which would come closest to illuminating the questions referred to me when our own rosarians couldn't be reached.

I then tried these problems out on a few leading members of the St. Louis Rose Society. They were all most cooperative. The *short* summaries under the *long* problems, therefore, are valuable siftings of much experience with roses in this area. They make a supplementary footnote to Mrs. McClure's performance.

### Problem #1

A friend of yours in Kirkwood has a big old garden which is too shady for roses, and he has concentrated on flowering trees and fine perennials and has become an excellent gardener. However, an ancient elm has had to be removed. This leaves a reasonably sunny place for a small rose garden. He'd like one or two varieties to start with which will provide his wife with quantities of fresh roses which she would use for mass display in their entrance hallway throughout the growing season. The little rose garden will also be a focal point for the view out the dining room window; an indication of bloom throughout as much of the year as possible will point up the garden picture as seen from the dining room. Remember the man is a good gardener, though not experienced with modern roses, and will familiarize himself with present-day feeding and protective techniques. What two varieties do you recommend?

Those which were suggested more than once have an asterisk.

The Fairy* (but learn how to prune it and not like other roses)

Pinnochio (longest keeping on bush or in water)

Betty Prior (The flowers keep well for a single rose.)

Frensham (red yet does not fade)
Fashion
Christopher Stone
Floradora
Carrousel
Queen Elizabeth*

### PROBLEM #2

An old friend of yours is now chairman of the board of a small-town cemetery half way between St. Louis and Jefferson City. Money has been left for buying rose plants for a few ornamental beds near the little chapel just inside the entrance; some will be circular, others long and narrow. There are reasonable funds for fertilizing in early spring and some equipment for watering during periods of drought. Other than reasonably good bluegrass and a few old trees in good condition there will be no other ornamental gardening in this area. The only workmen available for day-to-day care are the regular cemetery employees. They are dependable but not skilled gardeners. What is hoped for are some varieties which will give good displays of bloom in early summer and in the fall, with scattered bloom in between when the heat and drought are not too bad. What varieties do you recommend?

"If it's really as bad as you describe there's still nothing that can keep on taking it under those conditions as well as Radiance, Red Radiance and Mrs. Charles Bell."

"Use the best of Brownell's sub-zero roses, though none of them are show roses. I would recommend Lily Pons, Curly Pink, Pink Princess, Queen of the Lakes, Tip-Toes. Few or none will have to be replaced after bad winters."

"Sutters Gold* (it does get mildew)."

"Duet, Tropicana, Orleans."

### PROBLEM #3

Your favorite aunt has just retired to the old family home in South St. Louis after a professional career in business. Her aged mother's small rose garden in the back yard was well taken care of until last fall when her handyman entered a retirement home. Your aunt is still active, but she has her mother to look after and no servants, except a cleaning woman once a week. The only help she can hope to get is a school boy to work one afternoon a week. She wants to keep up the little rose garden. What are the *absolutely minimum* sprays, dusts, mulches, fertilizers, hose attachments, etc., she will need for a rose garden four feet square? The yard man formerly supplied all these. What kind of a watering schedule for dry periods, etc.?

Use any good general purpose rose dust, and dust once a week beginning when first leaves show and continuing until frost. Important to dust on both undersides and top sides of the leaves.

Roses in St. Louis need approximately one inch of water per week. Watch the newspaper summaries of rainfall and make up the difference with watering. A 25-foot plastic soil soaker would be practical for 10-foot square garden. Leave it in place throughout the season in under the rose bushes with the outlets directed downward. Take it up in the fall, unscrewing it at the end where the water enters, then beginning at the far end and lifting it up carefully and letting the water drain out. Get it well dried before putting it away for the winter. Do not allow it to be dragged from place to place for watering other parts of the garden. If run at approximately half pressure for an hour, it will give the rough equivalent of an inch of rain.

St. Louis roses should be mulched the first of June. Ground corn cobs are good though not quite so ornamental as some other mulches. They will make good soil and help in keeping down weeds. The first year put them on to a depth of two inches. One inch will usually be enough the second and later years. Roses should be fertilized three times during the summer. The most practical way to measure the amount is to spread one small handful per plant on top of the ground or the mulch. First application when the blooms show color; second application one month later; third application two months later.

Pruning should be done about April first. If you don't know how, come and see how it is being done in the two rose gardens at Shaw's Garden.

In mid-November to Thanksgiving pull the mulch up around the crown of the plant to give better winter protection. About April first level it off evenly under the bushes.

(Unlike the other two problems, the answer to this one was from one man. He put so much in a few words that we have printed all of it).

⁂

## POVERTY GRASS

MANY a Missouri ridge is lightly covered with *Danthonia spicata*, "poverty grass." The name is appropriate, for this species is an indicator that there is not much nourishment in the upper few inches of the soil. Frequently on dry hills it will be the main covering under old Red Cedars. It grows in low tufts a few inches high with narrow leaves which curl back as they wither.

E.A.

## A STRANGE AND EDIBLE MISSOURI GRASS

ONE of Missouri's strangest grasses is *Diarrhena americana*. It has no common name, more's the pity, for then attention might get directed to it and facts about it would become common knowledge. It's a shiny green perennial grass about knee high with flat leaves as wide as your finger. It spreads by underground stems and forms patches up to hundreds of feet across. In the Garden's Arboretum at Gray Summit there are many handsome stands of it on the talus slopes below the various cliffs in the area reserved for wild flowers. The woodchucks who live in these same talus slopes feed on it early in the season, which may be one reason it has spread out in such dense patches.

The Indians are said to have used it for food. Since it grows in such large stands it was not difficult to harvest enough of its somewhat prickly seeds to test their palatability. It was time-consuming to husk them but I managed it by putting them between two nesting stainless steel bowls from a set and rotating the upper bowl with light pressure. We got enough to cook and use for stuffing a good-sized roasting chicken. They were dark gray when cooked and looked and tasted not unlike wild rice, but with a distinctive and pleasant flavor of their own.

E.A.

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The Missouri Botanical Garden is a fund member of the Greater St. Louis Fund for Arts and Education.

# ODE TO SPRING

Spring is bustin' out all over. And so are activities at Shaw's Garden. Activity means action, action means people, and people mean more help. Yes, we need volunteer help in many areas and departments of the Missouri Botanical Garden.

First, **the lovely new Garden Gate Shop needs volunteer sales personnel** who can give as much as one day a week or as little as one day a month. The shop is open from 10:00 A. M. to 5:00 P. M. seven days a week—so pick your day. Mrs. Jane Stuessie, the Shop Manager, says it takes only a short time to learn the location of all the colorful items, which in essence, sell themselves. The wide windows of the shop overlook the beautiful lily pools and outdoor flower displays, which make working conditions a pure delight.

Second, **the Friends of the Garden Office needs** "lickers," "stuffers," "looker-uppers" or **any type of talent** that could be useful in the paper end of the Friends organization. The Friends' Office is a delightful spot in the old town house of Henry Shaw (administration building) decorated with antique furnishings as well as necessary office equipment. Again, as much as one day a week or as little as one day a month would give a real "shot in the arm" to the tremendous volume of work that goes through this office, which is open from 9 to 5 Monday through Friday under the guidance of Mrs. Leslie Gleason, Executive Secretary.

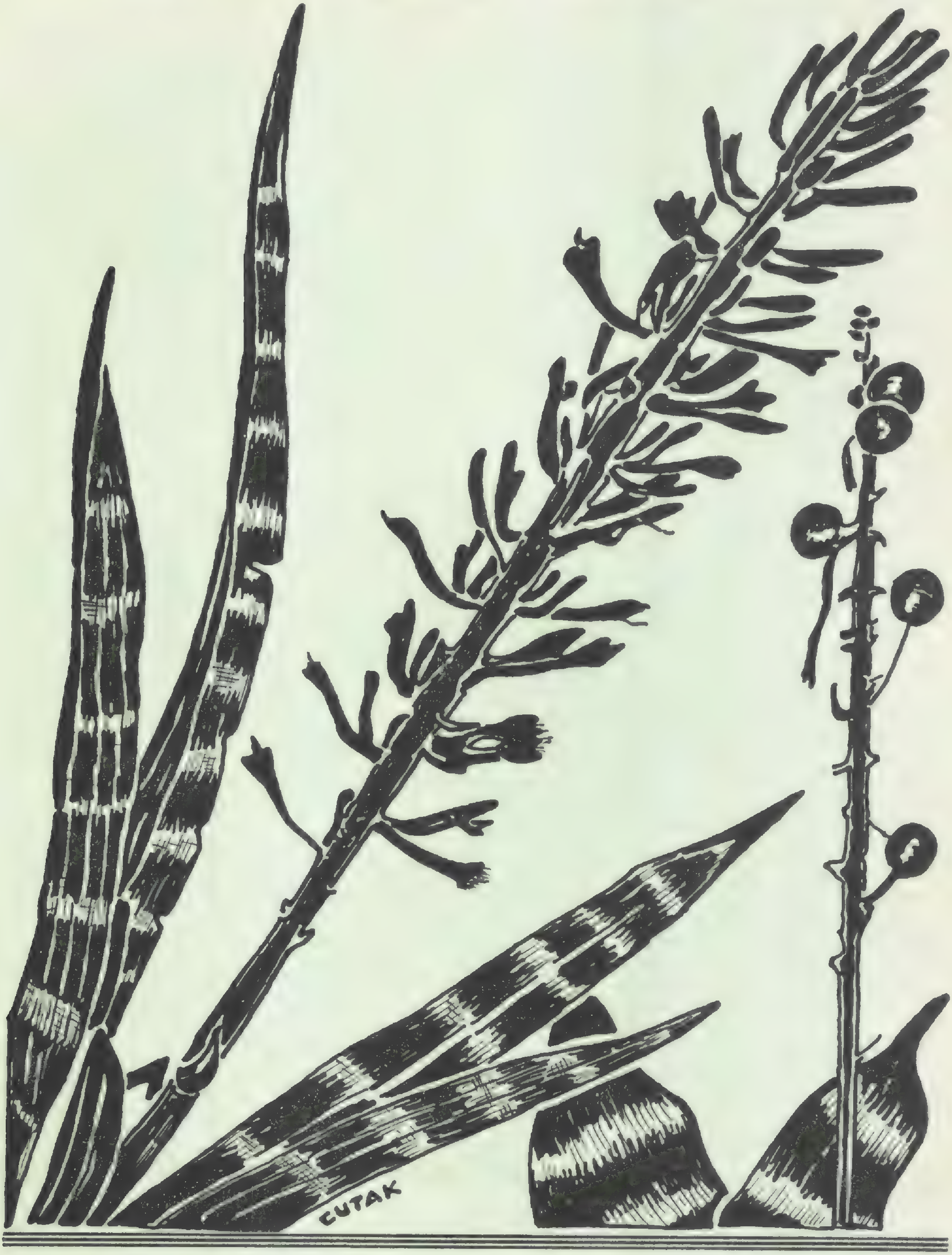
Next on our list is the Experimental Greenhouse and the Pitzman Summer Nature Study Course which is a free summer program for children between the ages of 7 and 16, Tuesday through Friday from 10 to 3 P. M. **Mr. Kenneth Peck,** its director, **needs help** with these classes one day per week or bi-weekly. Also, the same sort of assistance is needed in the Fall. What could be more enjoyable than helping while refreshing one's acquaintance with nature?

And fourth, **how about being a well-informed guide to the world-famous Climatron?** We have tours going through the Climatron many days of the month about which we are always notified in advance. Hence we are trying to build up a group of well informed volunteer guides to take these groups through. Mr. Kenneth Peck will give a complete tour of the Climatron along with several hours of instruction and copies of the necessary information to anyone interested in this fascinating pastime. All volunteers are notified well in advance of these tours so that no one person ever has to give unlimited time. In fact you might even combine this service with some other volunteer endeavor here at the Garden.

And last but not least, the **Tower Grove House** is having an **Orientation and Instruction program** May 12 from 9:30 to 2:30 for the purpose of training more volunteer hostesses for the oncoming summer season when more than 3,000 people a month pass through the doors of this lovely, old Italianate mansion.

So just mail a note or give a call to the Friends of the Garden Office, 2315 Tower Grove Avenue—TOwnsend 5-0440—and sign up for one of these interesting and intriguing jobs.

Missouri Botanical Garden Bulletin



# *All About Sansevierias*

FRONT COVER AND FIGURES ON PAGES 1 AND 11.

Two little known Sansevierias, the true S. *zeylanica* and S. *subspicata*. On the cover, drawn by Mr. Cutak in impressionistic profile, S. *zeylanica* in flower is to the left and S. *subspicata* going to seed and ripening five little berries (1 to 3 seeds each if all goes well) is to the right.

The commonest of all the Sansevierias was long—and incorrectly—known as S. *zeylanica*. It and its even commoner variegated variety are illustrated on pages 7 and 12 under the name now used by experts, S. *trifasciata*. The old name will probably persist in catalogues and commerce (and probably even in some botanical books) for decades if not for centuries. A scientific name, once well known, dies hard, for the fate of a language depends upon the people who speak it.

On the rear outer cover Mr. Cutak has contrasted the leaves and growing habits of four quite different Sansevierias. E.A.

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Editor: EDGAR ANDERSON.

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# Missouri Botanical Garden Bulletin

Vol. LIV No. 6
June 1966

## FOOL-HARDY SANSEVIERIAS

LADISLAUS CUTAK

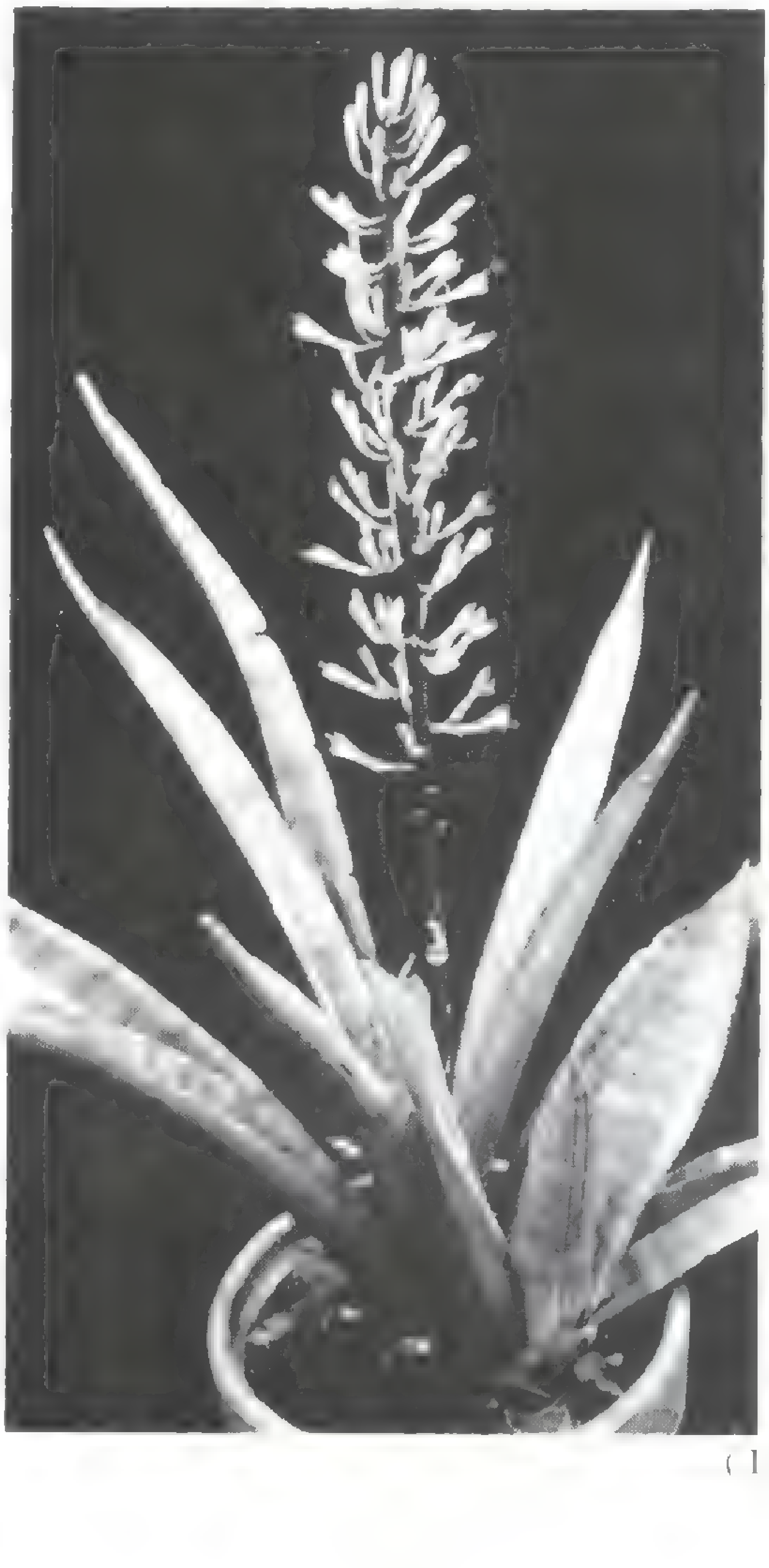
SANSEVIERIAS are probably the most rugged house plants in existence, and at the same time the most satisfactory in the decorative class. No other plants will stand so much abuse and like it! Although two to four species have been universally grown, there are over 50 varieties described and more of these coming into the limelight. Bowstring Hemp, Mother-in-Law's Tongue, Snake Plant, and Leopard Lily are some of the common names by which Sansevierias are known.

Sansevierias are bold plants in the extreme and therefore harmonize nicely with modernistic architecture and home furnishings. The elegantly-long, exquisitely-marbled, erect and stiff leaves are synonymous with present artistic trends.

Sansevierias are members of the Lily family and have been confined to the tropic regions of the African continent and the islands near its coast. A few have been found in other parts of the world, mostly India, Burma, Ceylon and China. Like the Prickly Pear Cactus, which has been naturalized in many parts of the world, so too, the Sansevierias will be found in a semi-wild state in tropical regions like Hawaii, the Philippines, Bahamas, West Indies and Central America. The leaves of all Sansevierias contain fiber varying in quality and quantity with the different species. The economical ones are extensively grown in tropical regions for the valuable fiber which is chiefly employed in rope making.

Sansevierias, on the whole, are stemless plants with a creeping rootstock. This rootstock can be of pencil thickness or as thick as a man's wrist, long

SANSEVIERIA ZEYLANICA
Native to Ceylon—the true species.



or short, white, cream, cinnamon, brown, yellow, orange or red in color. In some species the rootstock is partially exposed, entirely above ground, or completely hidden underground. The number of leaves produced at each joint varies with the different species. In some instances only one leaf is produced, in others two or three, and in still others five to fifteen and more. The leaves are fleshy to leatherlike in texture, stiff and erect or sometimes fanning out or spreading in rosette fashion. In some of the species the leaves are flattened, in others heavily channeled, and in a few half-cylindric to cylindric. The length and width of the leaves also varies considerably. They can be only a few inches long or under a half inch broad and sometimes will attain a length of ten feet. However, all of them are dwarfed when grown as pot specimens.

SANSEVIERIA LONGIFLORA

Produces a dense flower-head with individual flowers up to 4 inches long.

Many people have never seen the Sansevierias in bloom and, therefore, scarcely would know that they belong to the Lily family. When they do bloom the grower gets excited and calls in his friends to view the spectacle! The flowerstalks of Sansevierias are either simple or branching and support slender-tubed flowers whose petals roll back or spread out widely like typical lily flowers. The flowers are solitary or appear in clusters and usually are white to greenish in color, sometimes tinted with purple or pink. The flowers become fully opened in early evening and frequently emit a delightful fragrance like that of Hyacinths or Tuberoses.

Sansevierias are not grown for the flowers at all, but rather for the fascinating foliage which is now also used a great deal by all flower arrangers in exciting arrangements and table pieces.

There is no trouble in raising Sansevierias which can be propagated by seed, rootstock division and by leaf cuttings. Propagation by seed, of course, is the slower process. Leaf cuttings cut into 3-inch lengths are best suitable for reproduction, but it is to be remembered that all striped varieties will revert to the plain green leaves. To increase the highly decorative types one must rely on division of the rootstocks only. Leaf cuttings will root readily in sand or vermiculite but young plants may not appear for at least a month or two. However, once established the juvenile growth continues to maturity at a rapid pace. Rootstocks often lie dormant for two years, as has been my experience with some species.

Sansevierias will prosper in almost any type of soil with either a liberal supply or scanty amount of water, and will grow equally as well in darkened rooms as in sunlit parlors. The plants are hardy enough to survive low (above freezing) temperatures but definitely warm rooms are to their best liking. The fact that they are almost pest-free should induce all home owners to grow the plants. The Sansevierias look attractive in almost any kind of container, whether it be an ordinary flower pot, window box or a pottery novelty. The taller varieties are good for jardinières inside entrance ways, beside staircases and other such locations where plants are much desired but not often successful.

Sansevierias are the most fool-hardy plants when it comes to their care; however, a few hints will be helpful to assure strong healthy plants. As to soil, almost any kind will suffice but the most suitable is a mixture of sand, well decomposed leafmold, and garden loam in about equal parts. Such a soil aerates best and water permeates and saturates the mass. There is then less chance of soil drying out or holding sogginess for long periods. Although not necessary, the addition of some well rotted cow manure or sprinkling of complete commercial fertilizer will be beneficial. If the fertilizer is not incorporated into the soil mixture, then liquid fertilizer can be applied once or twice a year, either in spring or summer.

If the soil is highly drainable, then watering can be carried on normally as for most house plants. This will depend on the warmth and dryness of location. In the average home this might be every other day. Often the home gardener fills the container with soil to the very rim, allowing only a proverbial thimbleful of water, which would not be enough even if watering was applied daily or more often. Be sure to have at least one inch of space from soil surface to rim of pot; then, under such conditions, a tumblerful of water would be sufficient to penetrate to the roots where needed. If soil is drainable and dries out normally,

SANSEVIERIA CANALICULATA

Native of tropical Africa. A cylindric-leaved species with only one or two leaves to a growth and an inflorescence that hugs close to the ground.

watering every other day may be a happy medium, skipping days which are cloudy, especially in the dreary months of winter. If you must err, do it slightly on the drier side for safety. When Sansevierias are kept indoors the year round, it is advisable to place the plants in the bathtub or kitchen sink and syringe the foliage to remove dirt and grime. This can be done once a month.

Repotting Sansevierias is not necessary, except when growths fill the container or the rootstocks begin to push above the soil or emerge from the drainage hole. Repotting once a year is the customary method, but it can be held off for two years without any harm. Usually when leaves tend to crowd each other, some of them will spiral or assume contorted shapes and these then are desirable for arrangements. When it is time for repotting, "de-pot" the plant, split the ball in half or thirds and shift into individual pots but do not water the transplants for at least a week. This is the way to increase your stocks.

Sansevierias do best in filtered light and, therefore, should be placed in semi-shaded alcoves, porches or near east and north windows during the summer months. South and west windows are ideal for the plants during the winter season as there is less chance for plants to be burned. It is not necessary to move or rotate plants frequently, although an occasional move will benefit the individual.

Any plant placed outdoors during warm weather will welcome the change from a stuffy room and Sansevierias are no exception. If one can set the pots under a tree where they are sheltered from the full sun and still receive plenty of light, this will be ideal. I wouldn't recommend plunging the pots in the ground or planting direct in soil after depotting as there will be some work attached in the fall when readying the plants for bringing indoors. However, this is up to the individual.

There are at least 60 different kinds of Sansevierias described but unfortunately only a small percentage are available in the trade. However, new importations and new horticultural forms are cropping up periodically. If one desires to secure a Sansevieria collection, only about 20 or 25 varieties are available from dealers at the present time.

The commonest Sansevieria in existence is S. *trifasciata,* which is as ubiquitous as the Heartleaf Philodendron found in almost every home. The florist usually will sell this plant under the erroneous name of S. *zeylanica.* The true S. *zeylanica* in reality is a much more slender and smaller plant which only in the last decade was introduced into the trade in America. S. *trifasciata* is a stemless plant with a creeping rootstock producing 2 to 6 erect leatherlike leaves up to 4 feet high. In the juvenile leaves beautiful silver and dark green marbled bands appear but are later nearly obscured. Its golden striped variety, S. *trifasciata* var. *Laurentii,* is like the type in every detail except that its foliage is remarkably striped with golden yellow at the margins. It originated in the Belgian Congo. The only way it can be reproduced is by root-

SANSEVIERIA TRIFASCIATA var. LAURENTII

From the Belgian Congo, leading commercial variety with yellowish margins.

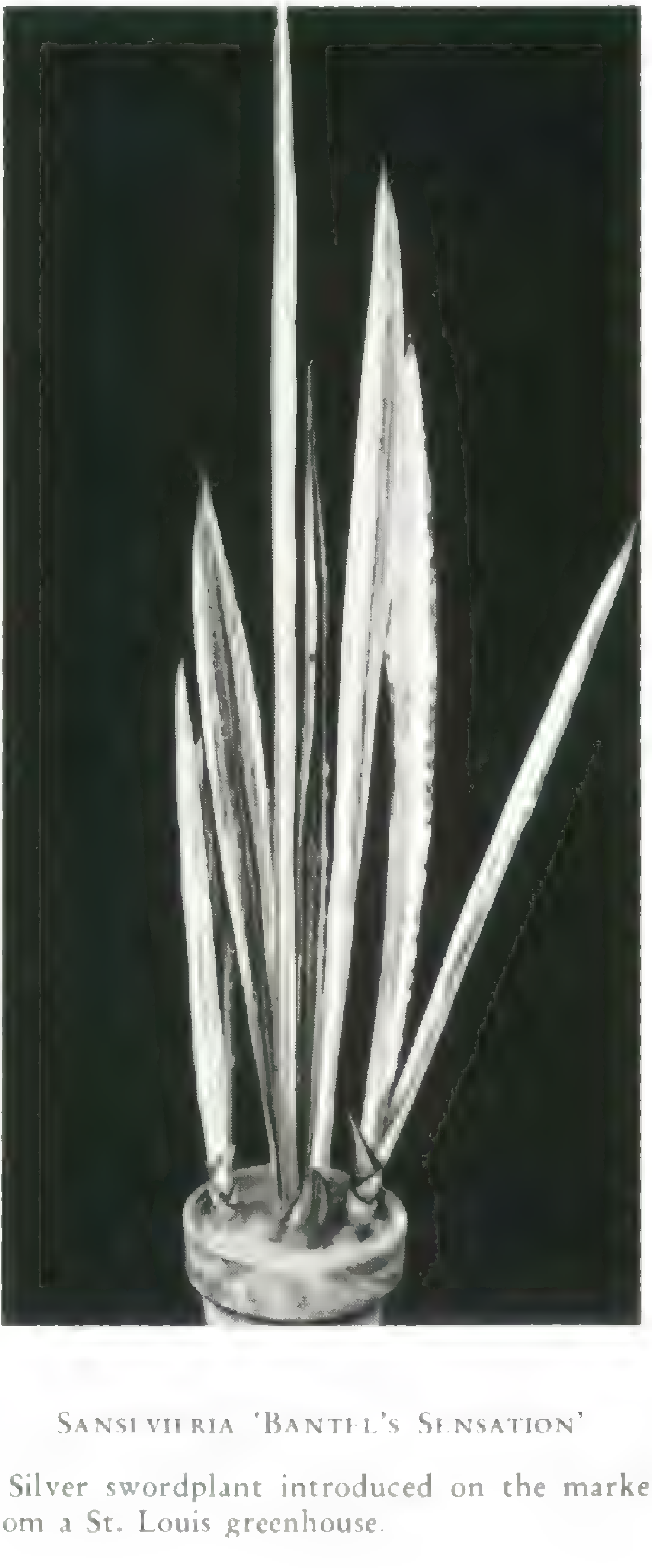
stock division. There are several horticultural forms of the golden striped plant, one that is almost yellow with only a small narrow green stripe through the center of the leaf is known as S. var. CRAIGII.

Florists have been propagating the plain green and golden striped plants by the thousands and when this many leaf cuttings are made there is always the possibility of new strains developing. The alert grower picks these out and begins to propagate them to work up a stock. Sometimes it will take several years because the propagation must be entirely done from rootstocks. This is the way Bantel's *Sensation* was originated back in 1927 and only sufficiently produced in quantity years later. *Sensation* is a patented plant and a real horticultural novelty worthy to be included in every collection.

The late Gus Bantel of the Sieloff Floral Company in St. Louis with his patented Sansevieria "Bantel's Sensation."

It was sold by the Sieloff Floral Company in St. Louis, where it originated, but in recent years this firm discontinued the Sansevierias when a changeover was made to other plants. One can probably get it at Julius Roehrs Company in Rutherford, New Jersey, or some of the nurseries in Florida who specialize in such plants. It produces two to four or more stiffly erect, slenderly sword-shaped leaves to each growth and the leaves are beautifully streaked silver white on a very dark green background. Often a greater portion of the leaf is more silver than green. Dr. Edgar Anderson, Botanist at the Garden, thinks a lot of this plant. He knows of no other plant that can give more beauty and put up with more abuse and look handsome under more conditions than Bantel's *Sensation.* And this author heartily agrees with his statement!

The Birdnest, S. *hahnii*, is unlike any other Sansevieria known to exist and was the first to be patented. Since it remains small and propagates readily it ought to be included in every household. The comparatively short, broad leaves are arrayed in birdnest fashion and in youth possess the characteristic silver and dark green alternating bands which change in age to darker hues. A variegated sport has been developed with longitudinal yellow



Sansevieria 'Bantel's Sensation'

Silver swordplant introduced on the market from a St. Louis greenhouse.

stripes which is known as S. *hahnii* var. *aureo-striata.* There is also a grey-leaved form with hardly any mottling and known as the "Silver Hahnii."

*Sansevieria longiflora* is one of the robust flat-leaved types producing thick orange-cinnamon rootstocks from which seven, leatherlike, lanceolate leaves shoot up to form a growth. The leaves attain a size of three or more feet and are dull blackish green marked on both sides with blotches and spots of paler green which are arranged in irregular transverse bands. An even more robust plant, a sort of glorified version of S. *longiflora*, is S. *aubrytiana.* I am not yet sure whether this is the correct name, but it has been grown at the Missouri Botanical Garden for several years and has proven to be an excellent subject for places that require bold plants. The leaves are very strongly banded on both surfaces with zigzag markings and are three or more feet long and from five to seven inches broad. It is an excellent patio subject or doorway ornament.

SANSEVIERIA TRIFASCIATA

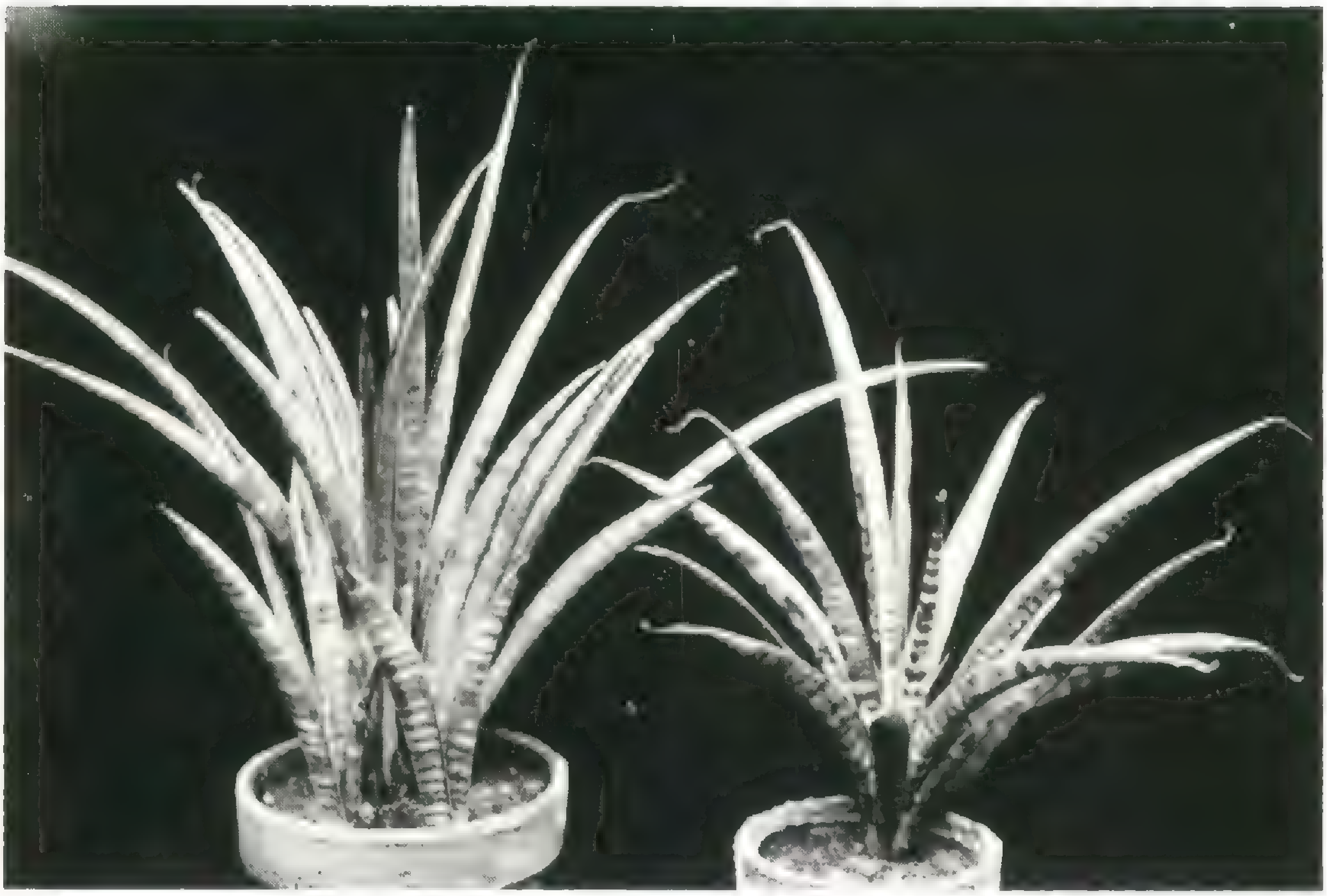
Native to tropical Africa and the commonest in cultivation.

SANSEVIERIA AUBRYTIANA

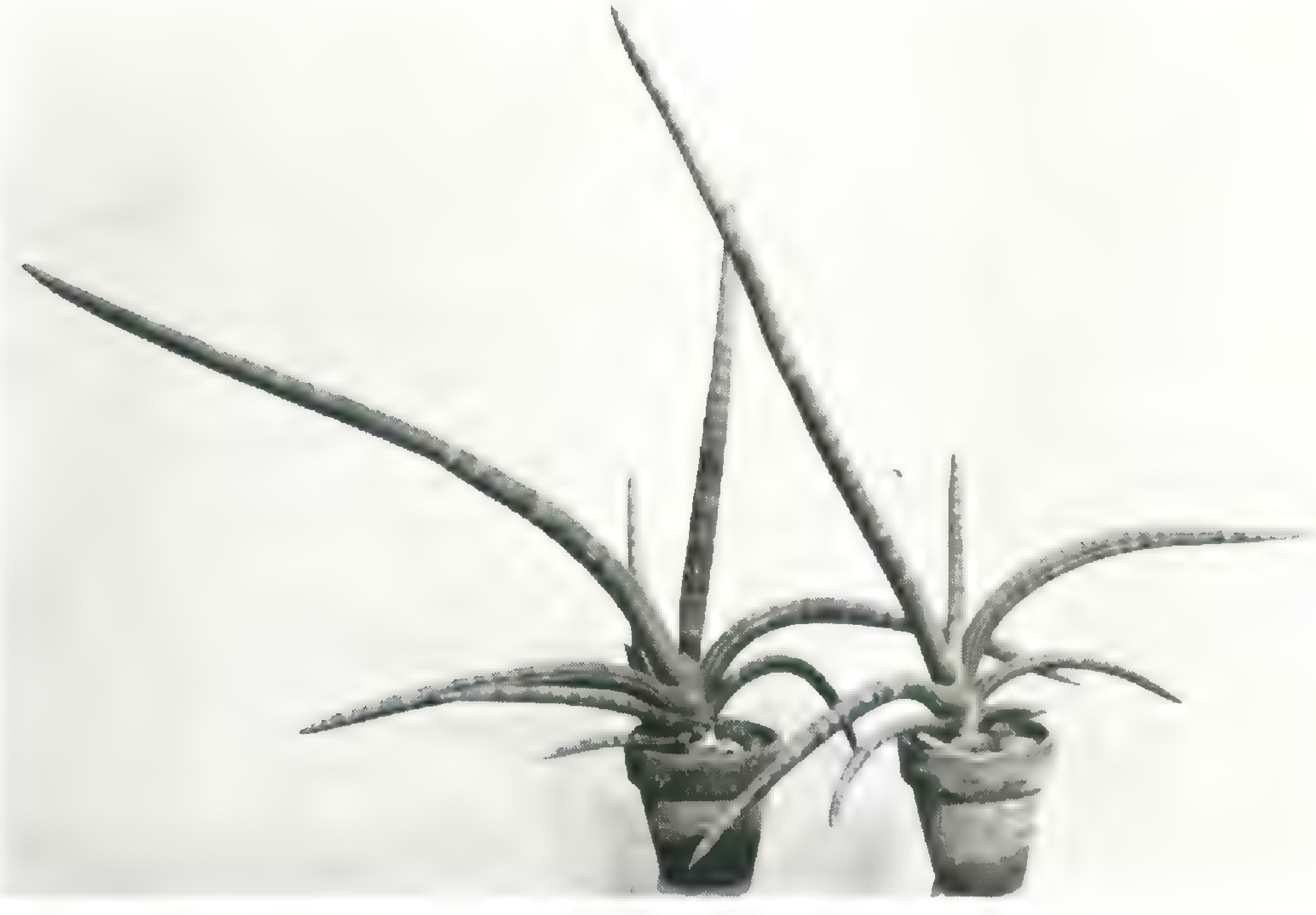
From equatorial Africa, robust grower with leaves 7 inches across.

Probably the best known of the cylindric-leaved Sansevierias is S. *cyl-*

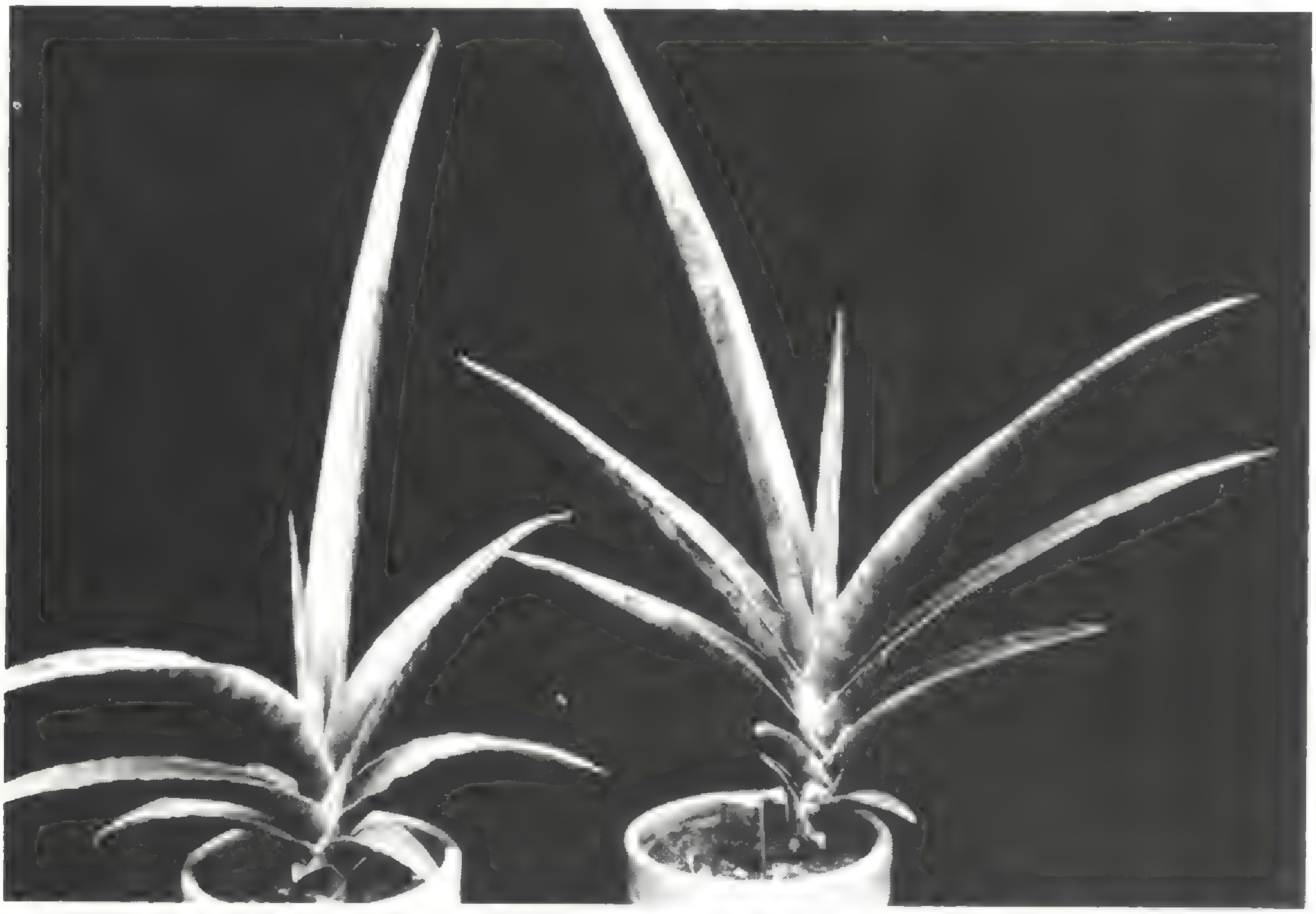
(Continued on page 11)



SANSEVIERIA AETHIOPICA
Compact grower from South Africa.

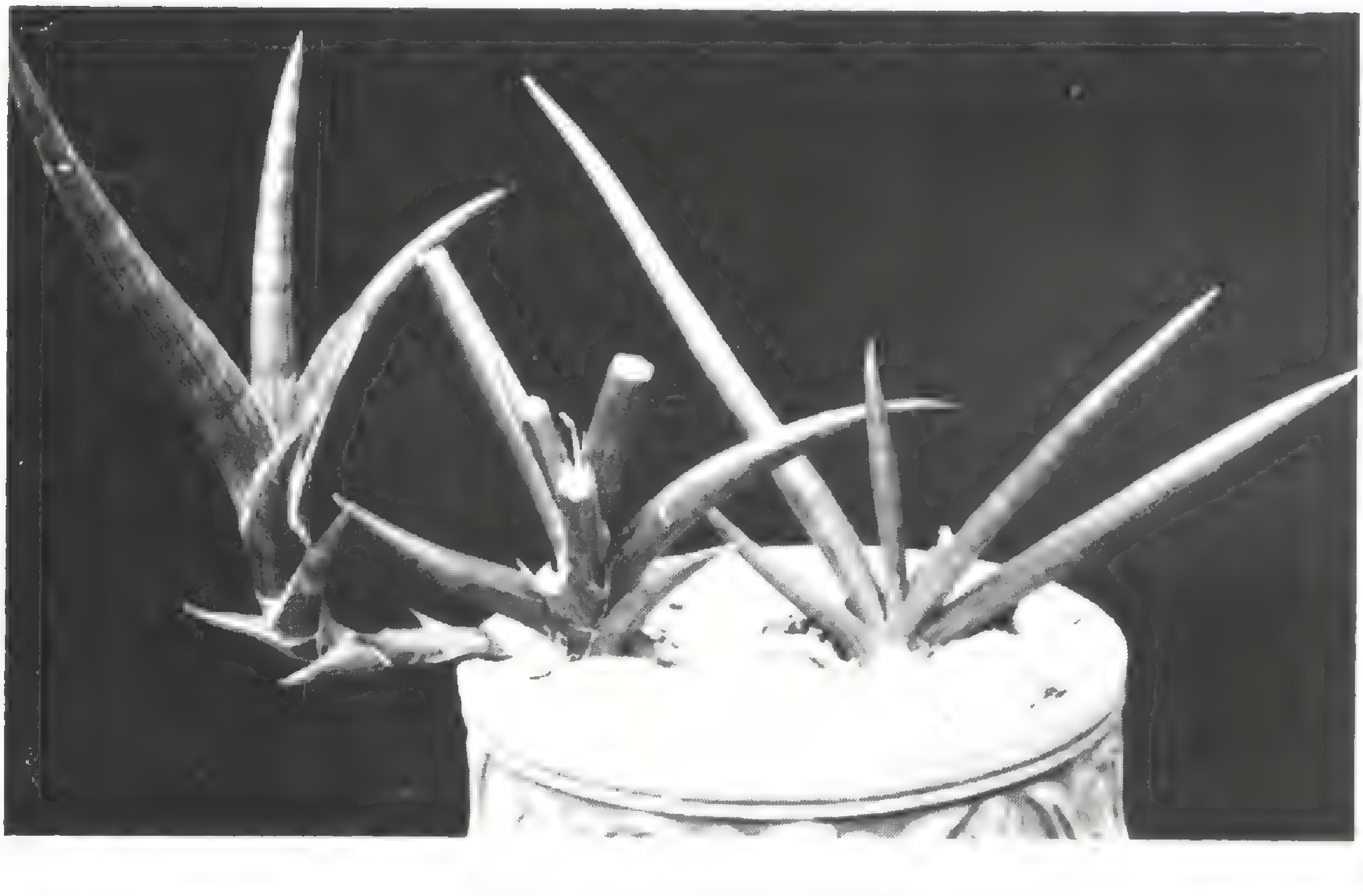


SANSEVIERIA CYLINDRICA var. PATULA
A slenderly dwarf fan-shaped variety of the above.



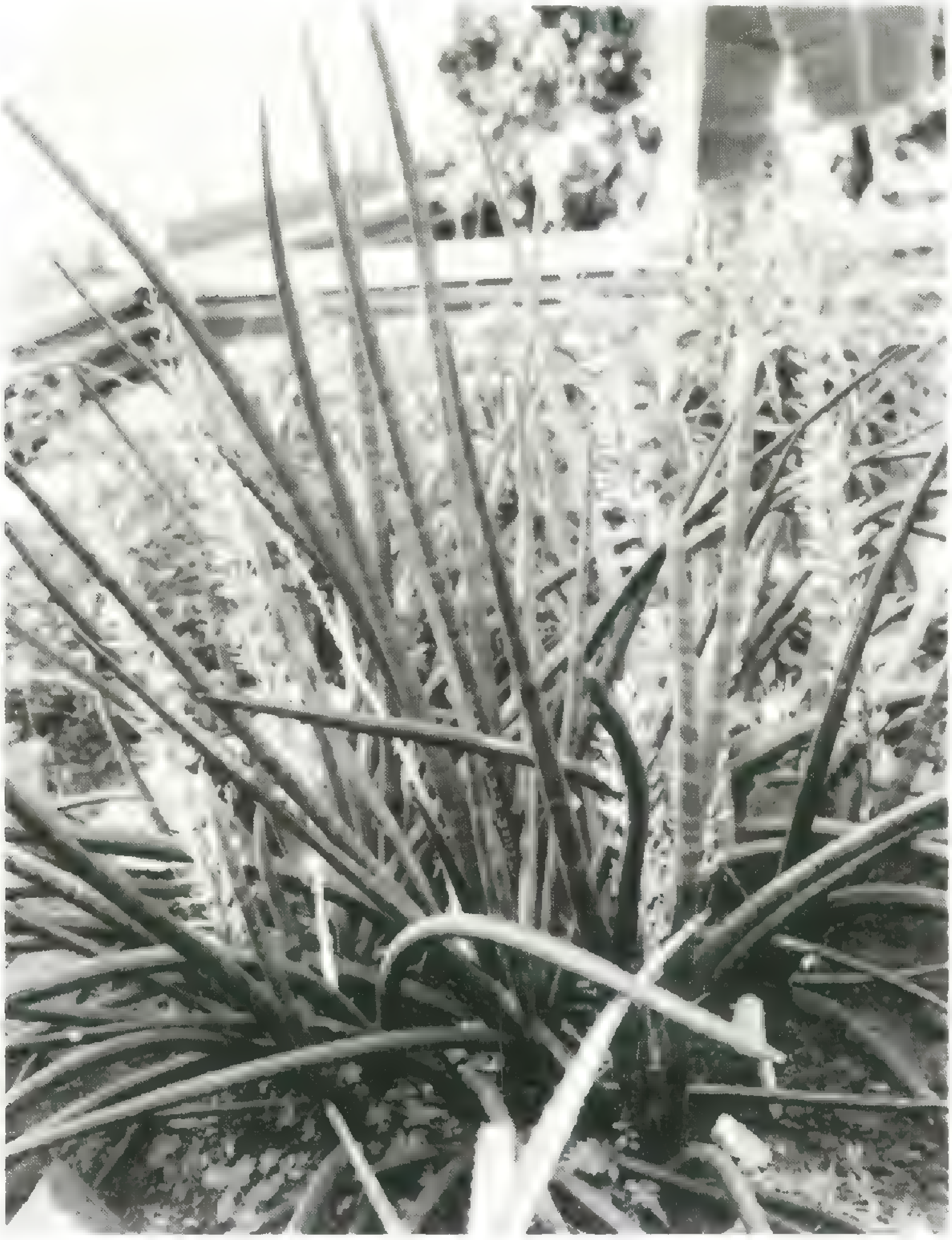
SANSEVIERIA EHRENBERGII

Native to Ethiopia, a robust grower, with leaves in fan fashion.

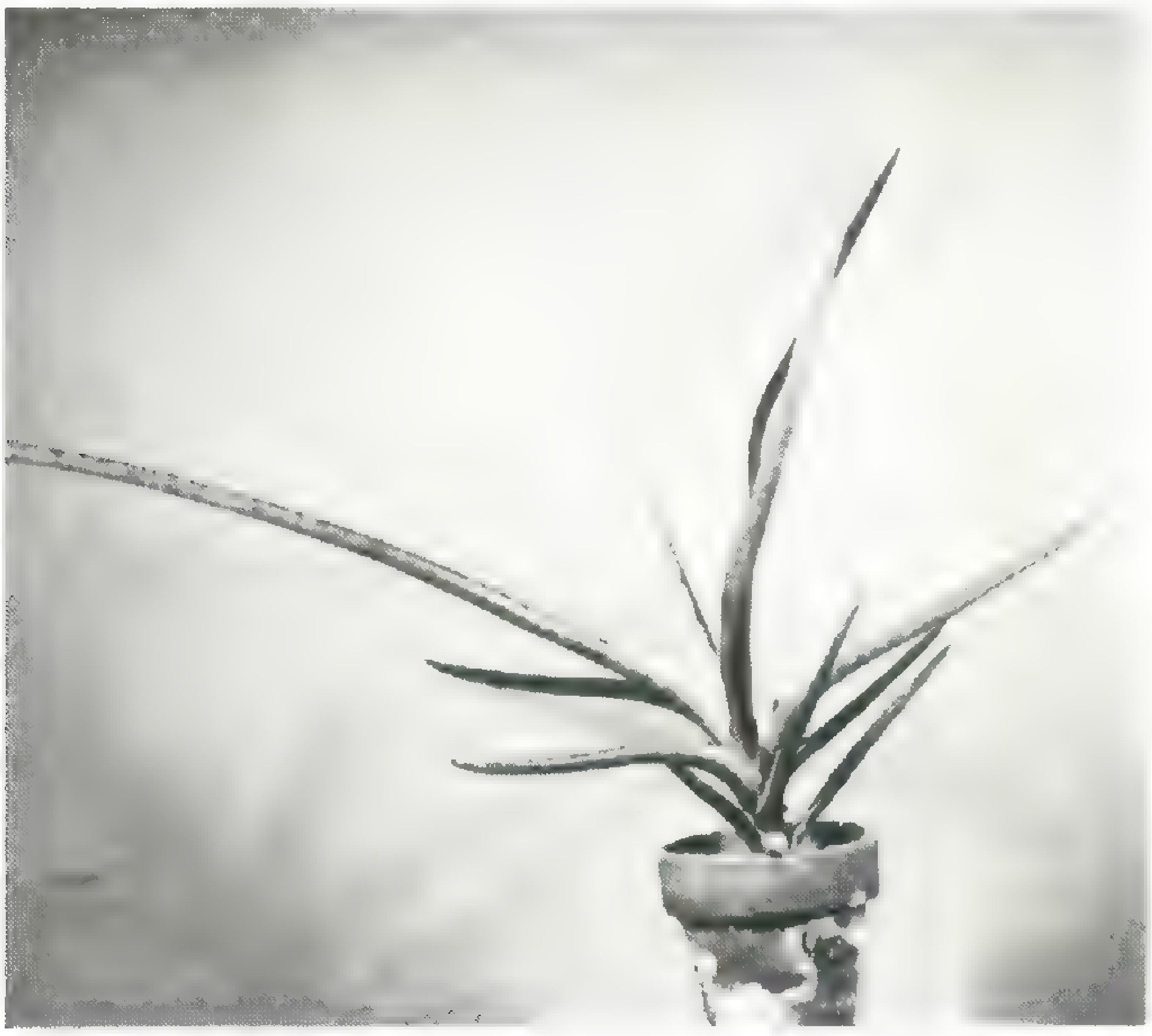


SANSEVIERIA SUFFRUTICOSA

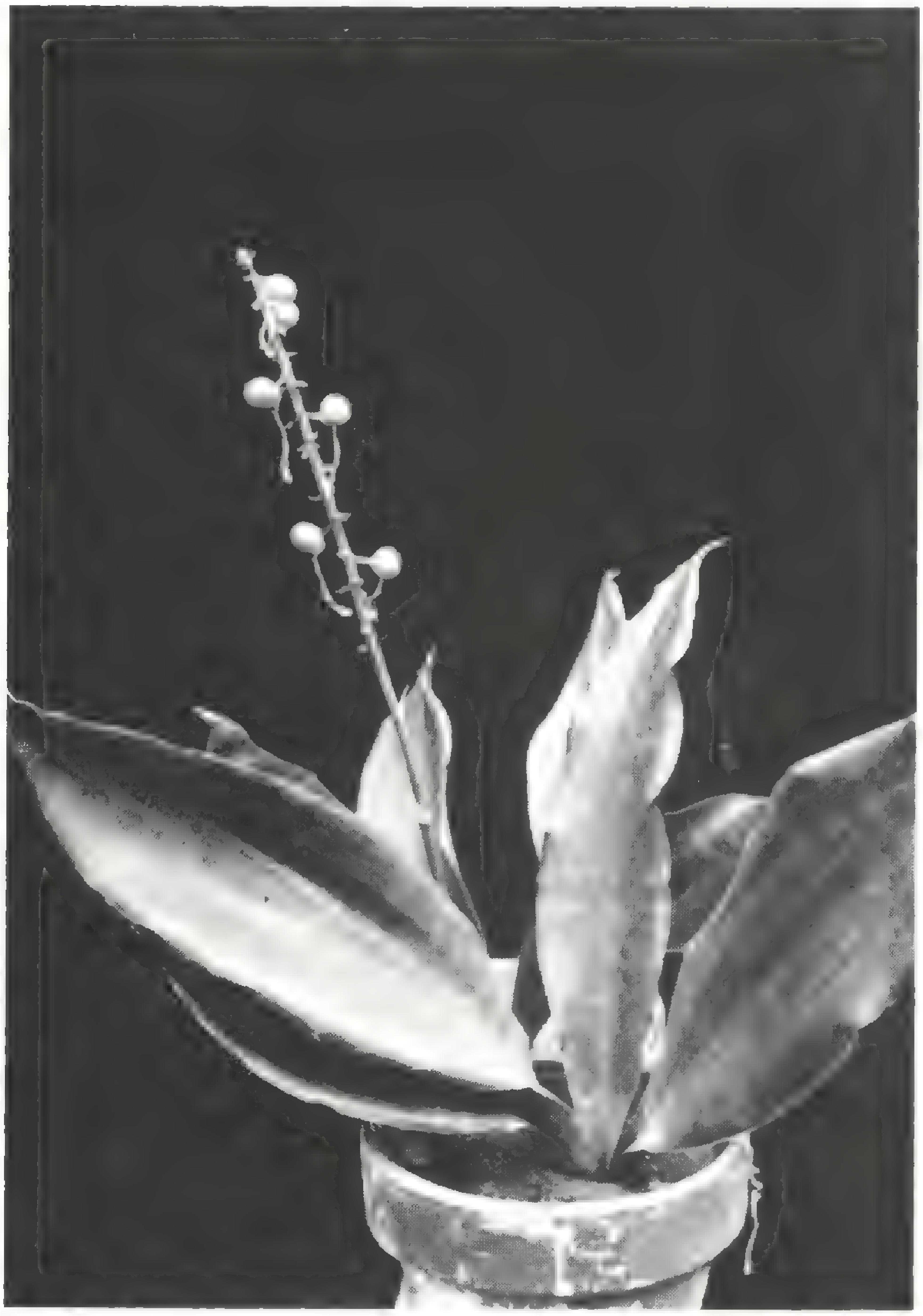
Native to Kenya. Growths appear from runners, either above or under ground.



Sansevieria cylindrica
Unusual cylindric-leaved species from tropical Africa.



Sansevieria gracilis
A graceful dwarf species.



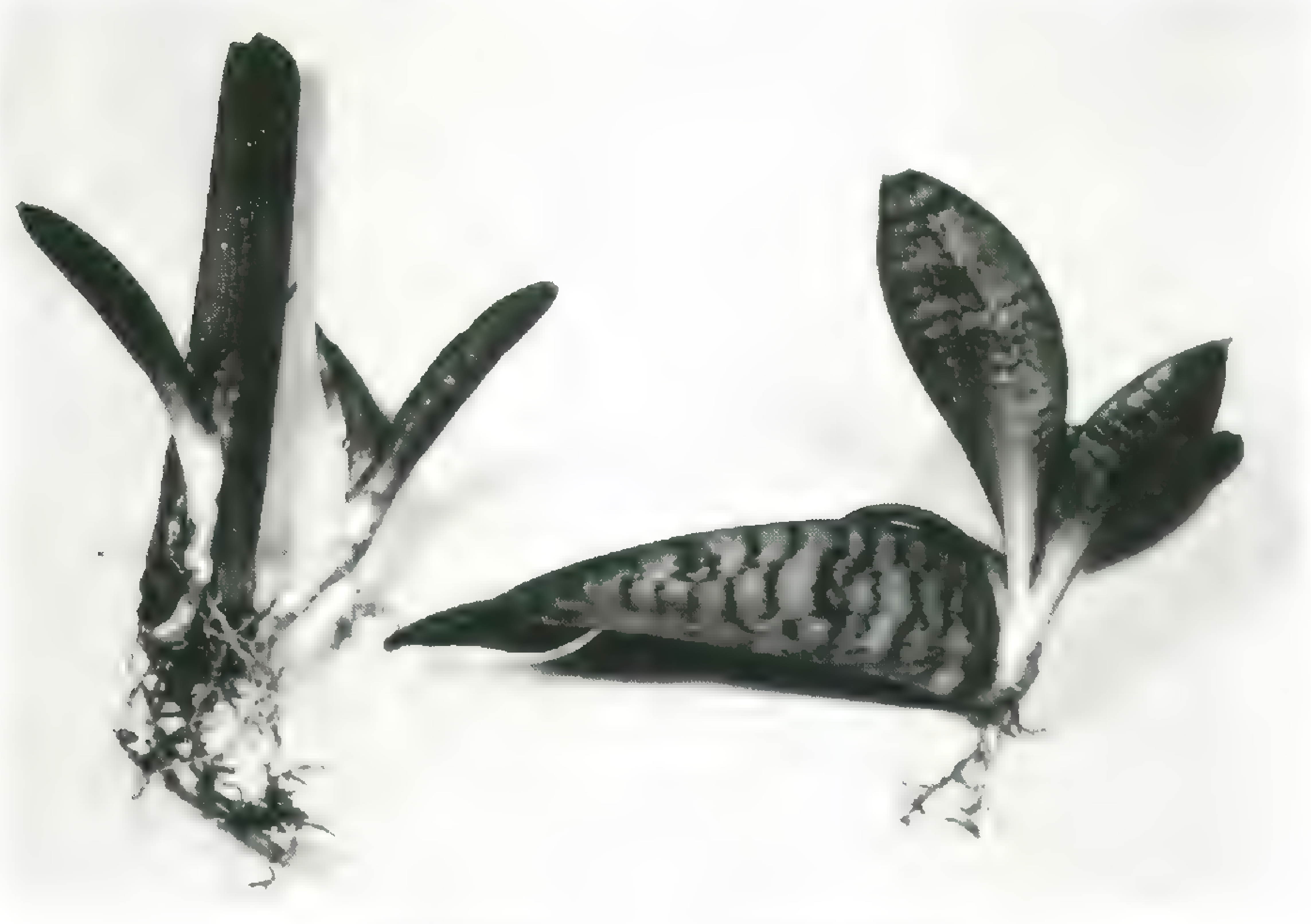
SANSEVIERIA SUBSPICATA

From South Africa. Good fast-growing border plant.

*indrica.* The leaves, solid within, filled with firm cellular matter and an abundance of fiber, attain a length of five to seven feet and resemble a piece of rubber hose. Young plants are best suited for the average home because in pots they remain small and the cylindric leaves often spread out fanwise due to an abrupt curving near the base. In youth the leaves exhibit light green bands and when kept drier the leaves show pronounced furrows from base to tip.

*Sansevieria canaliculata* is a unique species because it usually produces only one cylindric leaf to a growth but these growths are firmly close together. S. *gracilis* is a graceful dwarf plant which produces short stems above the ground. Another is S. *suffruticosa.* Both of these exhibit channeled leaves at the base but farther up

SANSEVIERIA TRIFASCIATA var. LAURENTII
Mass planting of this popular variety.



SANSEVIERIA LEAF PROPAGATION
from cylindric and flat-leaved species.

to the tip the channeled portion merges into a cylindric leaf. A semi-cylindric species is S. *ehrenbergii.* Five to nine bluish green leaves appear in a growth and spread out like a fan. This is a very distinct plant highly recommended for anybody's collection.

In my opinion S. *aethiopica,* S. *zeylanica* and S. *nelsonii* are three of the most desirable dwarf Sansevierias in existence. All produce tufts of many leaves and are compact specimens suitable for either pots or window boxes. The first consists of about twenty-five, narrow, ascending-spreading leaves to each tuft. Their beauty is further enhanced by a bluish hue which covers them. The second plant is darker green in color with more flattened leaves that have distinct lines of varying lengths running longitudinally on the backside of the leaves. There are fewer leaves to a growth and these are about an inch broad and under three feet long. The third is comparatively new in the trade, having been introduced only several years ago. It possesses an upright symmetrical rosette of vertical dark green leaves which are very nearly black-green in color.

The two dwarf types are S. *parva* and S. *subspicata.* Both of them increase very rapidly by stolons. S. *parva* is the more delicate of the two, not in the sense of hardiness but in graceful symmetry. The leaves are very narrow and channeled, forming an open upright rosette, while the leaves of S. *subspicata* are very broad and flat with brown edges. The former has a slender rootstock which often pushes its way above the ground and arches, whereas the rootstock of the latter is conspicuously thick underground.

*Sansevieria arborescens* is the most unusual species in the whole group. One would hardly classify it as a Sansevieria. It grows like a small tree with a stem three or four feet high which is completely surrounded by very spreading or recurving, twisting green leaves with wavy whitish margins.

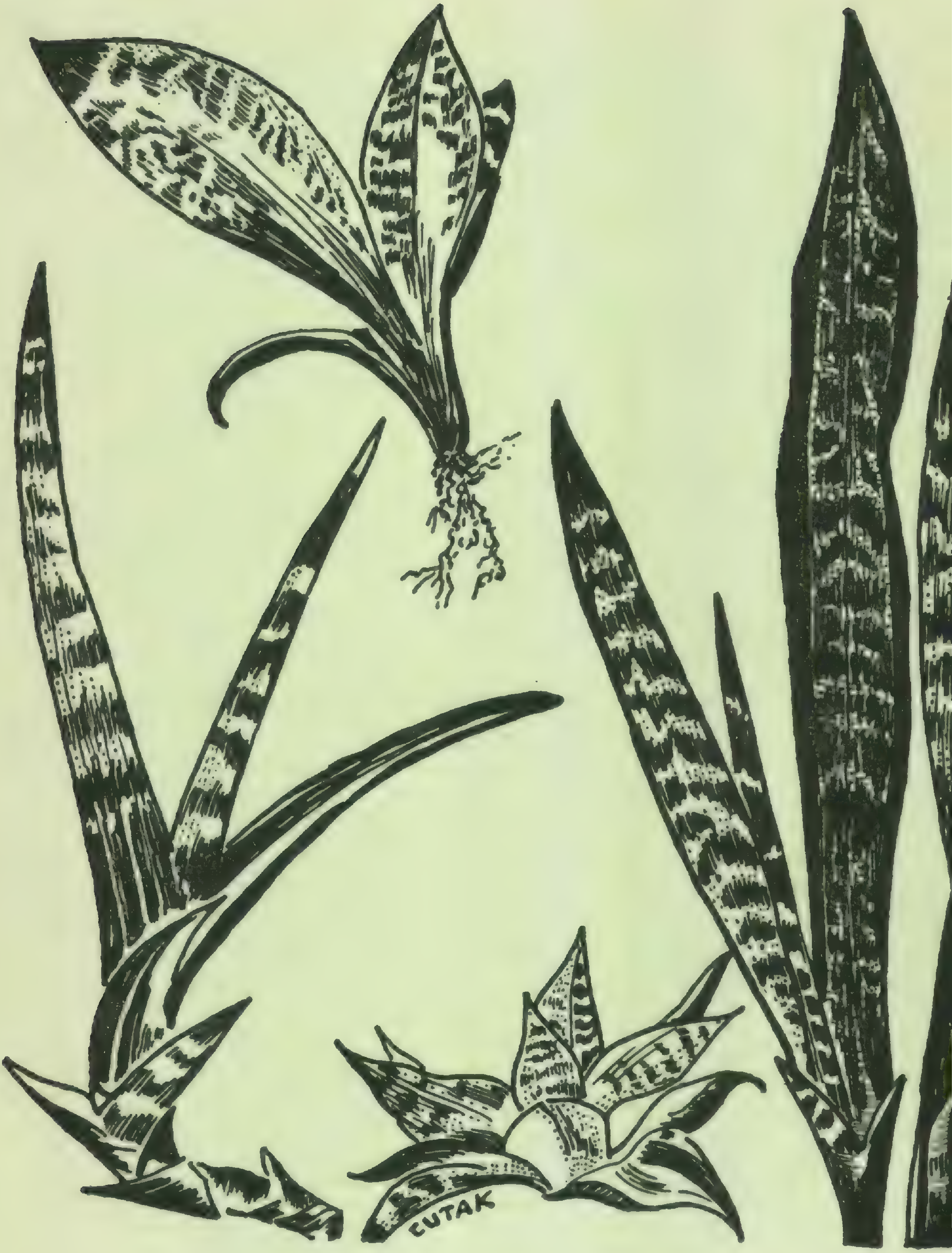
Sansevierias were popular Victorian era plants but only a few were known to gardeners. Today they are again fast becoming favorites with house plant addicts because they require so little care and tolerate all kinds of unfavorable conditions while giving so much in the way of ornamental value. And too, many more species and varieties are available.

Sansevierias are classed as semi-succulents and, therefore, are grown and found in most cactophiles' collections. Members of the Henry Shaw Cactus Society grow and exhibit Sansevierias in their annual fall cactus show at the Garden and visitors are always welcome to their meetings held on the afternoon of the second Sunday of each month (except July) in the Museum Building. Sansevierias and other succulents are brought in, discussed, and ideas and hints given to the members.

The only mail order sources known to us for many of the varieties discussed in this booklet are the following dealers:

JULIUS ROEHRS COMPANY, Rutherford, N. J. (Wholesale only).

ALBERTS & MERKEL BROS., INC., P. O. Box 537, Boynton Beach, Fla. 33435


CUTAK

# MISSOURI BOTANICAL GARDEN

# *Bulletin*

September 1966
Volume LIV
Number 7

## *What's New at the Garden*

COVER: Bruce MacBryde (center) and his assistant, Melvin Wilson, busy measuring an Austrian Pine in the dusk of an approaching storm. The ladder at the right was afterwards replaced with one which reached to the very top of the tree. Through the branches of the tree one catches a glimpse of the brightly lighted open-air shed in which the children are having their afternoon lecture. See page 16 and pages 16–18 for further information about the two young men and their summer investigations.

PHOTO—C. JOHNSTON

* * *

Some Travel, Some Science, Some Summer
The New Park Building
Philip Conrath
Dynamics of Landscape
Azaleas for St. Louis
Nice New Orchids
English Visitor
Charging Admission
Our May Day Party
Staff Travels
Bonsai Course
Ear-Muffs — Salt-Pills
Youth Corps
Green Lawns
Herbarium Gift
Busy Students
Chilled Victorias
Kenneth Peck's Assistants
Coming Events
Young Scholars

* * *

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Missouri Botanical Garden
Vol. LIV No. 7 Bulletin September 1966

# SOME TRAVEL, SOME SCIENCE, SOME SUMMER

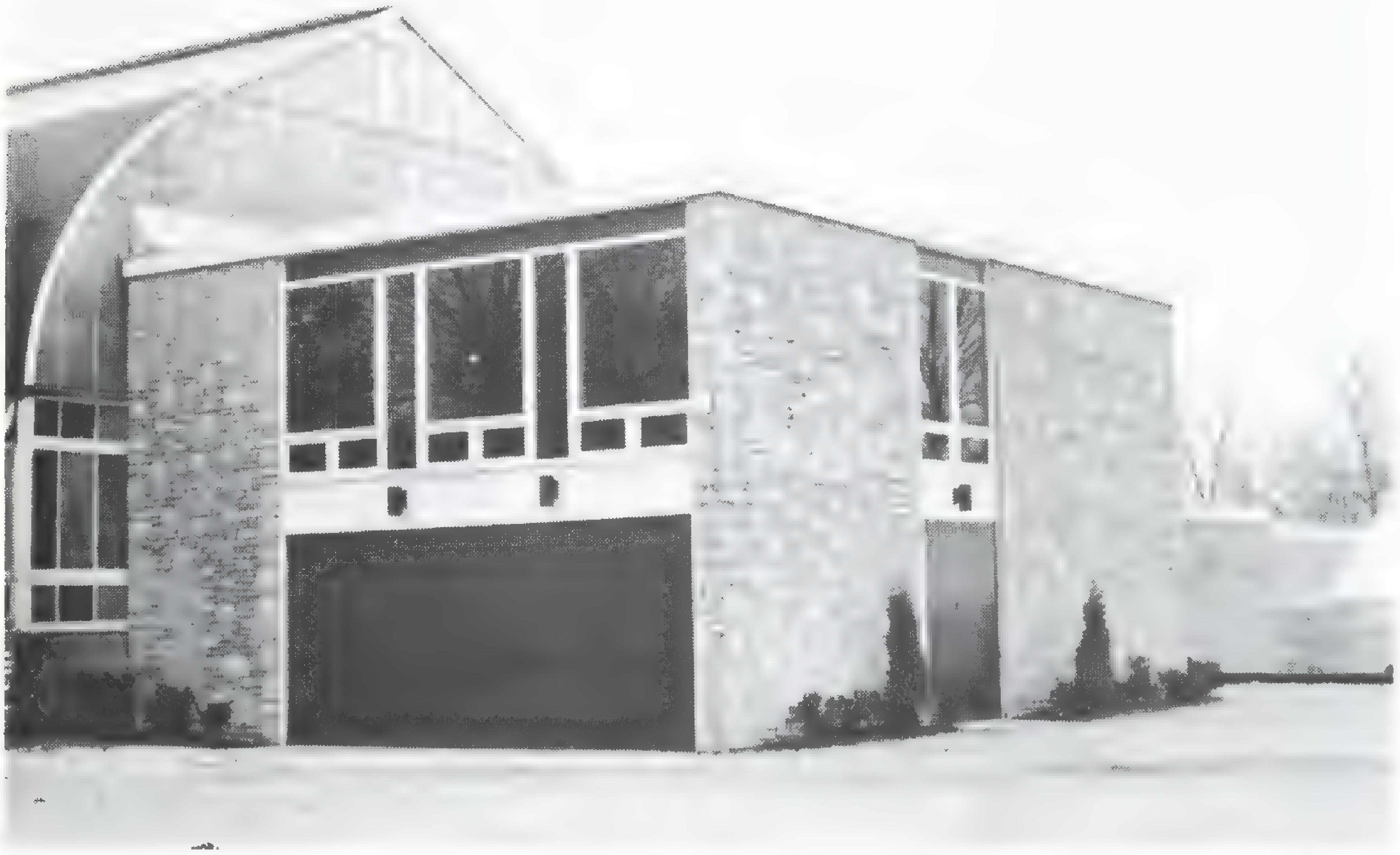
DAVID M. GATES

Is there life on Mars? This is one of the most tantalizing of questions posed by man, the answer to which will have immense impact on our thinking concerning evolution, universal life, and theology. Several laboratories supported directly or indirectly by the National Aeronautics and Space Agency are devoting much effort to the invention of instruments and schemes for detecting life on Mars when our space ships land on that planet. Despite the harsh, cold, dry, nearly waterless, Martian climate the "canals" are real features which suggest life and a growing season on Mars. The Space Sciences Laboratory at the University of California at Berkeley, the Ames Aeronautical Laboratory at Moffett Field, and the Jet Propulsion Laboratory of the California Institute of Technology each are pushing programs for life detection from planetary vehicles. If the space ship flies past a planet can it carry equipment which could photograph or otherwise record the surface features in sufficient detail to demonstrate the existence or non-existence of life? Could one indeed detect life on Earth if we flew by in space, unable to land, and looked down at the Earth as an unexplored, unknown planet?

In order to assist the National Aeronautics and Space Agency with their life search program I met at the Ames Research Center as a member of their Environmental Biology Advisory Panel. I also lectured at the University of California and the Jet Propulsion Laboratory. The scientists of these laboratories listened with interest because I had worked hard to understand the interaction between plants and environment here on Earth. Perhaps because at the University of Colorado, and now at the Missouri Botanical Garden and Washington University, my students and I have worked out the temperature and growth response of plants to sunlight, heat, wind and moisture, we could say something of how things might be on Mars or Venus. The scientists of NASA must also be able to produce life-support-systems for interplanetary travel in manned vehicles—systems which are self regenerative, can dispose of wastes and maintain fresh air and food for the crew. Our committee had to review requests for support from universities and laboratories throughout the country and make recommendations to NASA. At the Jet Propulsion Laboratory I saw and received copies of the first Moon pictures being sent back by radio beam from the lunar landing of Luna-9.

An Advanced Science Seminar on Desert Ecology, supported by the National Science Foundation, was held at the University of California Riverside Campus where I gave the opening lectures during the first two days of the seminar. Here, a few scientists discussed the adaptations of plants to the dry, hot, wind-swept extreme environment of deserts. Perhaps it was this or the short vacation in the high Rockies later which caused me to return to St. Louis in July, during the heat wave, and ask my students why they were not in the hot sun and humid air measuring the response of plants to such remarkable extremes. And so it was during the next six days these young scientists recorded the temperatures and water usage of many plants in the Garden with little concern for their own temperatures, moisture losses, or comfort. In fact, so enthusiastically did they engage themselves that they were four of the most disappointed people in St. Louis when the heat wave broke as cooler air moved into the region. More of that story later when we have analyzed the data.

Although we may understand plants in extreme environments, Walt Disney has created plants to withstand the onslaught of millions of people. The Swiss Family Robinson at Disneyland live in a concrete tree supported by a steel frame; a tree so realistic it is hard to discern from a distance its *ersatz* character. I was the guest of Bill Evans, chief horticulturist at Disneyland, whose responsibility it is to mix the real thing with the fake; so skillfully done that one must touch them to tell the difference. We were accompanied by Dr. Mildred Mathias, Professor of Botany at UCLA, and distinguished alumnus of the Missouri Botanical Garden, who arranged this special visit for me. We took all the rides and saw all the sights of Disneyland with the same wide-eyed amazement of any youngster and yet learned the challenge of growing and maintaining plants in one of the world's most harsh environments. A climate of concrete, asphalt and polluted air, and fourteen million feet and hands (seven million visitors) a year, to trample and pick and the attempts of Bill Evans and his crew to keep Disneyland green. A fantastic and amazing story of how to entertain the American public. And so also at the Garden we entertain, teach, and inspire the visiting public through the wonderful world of plants. In order to continue to do so and in accordance with a recommendation made by Henry Shaw, a charge of 25¢ was started at the Main Gate on July 15th for every visitor to the Garden over 12 years of age. The public response has been gratifying, almost as if their conscience had been relieved of a burden carried so long, that indeed without any direct tax support, the Garden desperately needed financial assistance. Hard work, by a loyal staff, has maintained Shaw's Garden as the greenest oasis in the city during a hot summer.



The Park Building in April, 1966, shortly after it was completed. The Floral Display House in the background is now being rebuilt to make a perfect all-weather junction with the new building.

PHOTO—PAUL A. KOHI

# THE NEW PARK BUILDING

A GENEROUS bequest from James J. Park provides at last an effective nerve-center for the care of the gardens and greenhouses, the staging of flower shows, and the supervision of the power plant. The new building, designed by Murphy and Mackey, is in the edge of the Service Area, immediately adjacent to the Floral Display House. The Orchid and Succulent Greenhouses are on one side and the new growing houses on the other side. The Park Building itself was completed last spring; the rebuilding of the north end of the Floral Display House (to provide a harmonious connection between the two) has been going forward this summer.

For the first time in the Garden's history the men who supervise the Garden's operations have efficient offices where they can interview applicants, telephone, store valuable records, and the like, instead of having to operate in crowded, noisy, makeshift quarters.

There are now all-weather connections between the Park Building and the associated greenhouses simplifying the staging of flower shows. It will no longer be difficult or impossible to move tender plants such as orchids and poinsettias into the Display House in freezing or rainy weather. One will no longer have to risk giving tropical plants a cold shock and can even plan ahead, weeks in advance, and never worry about the weather.

The Park Building is long. It extends all the way from the upper service area to a new large parking lot just inside the Alfred Avenue Service Gate. Trucks can enter at either end, thus simplifying the care and use of all the greenhouses. It is so attractive, spacious and convenient that already the Cactus and Succulent Society and the Rose Society have tried holding meetings there outside of work hours. The only bar to extending this privilege to other groups is that tables and chairs now have to be trucked from other parts of the Garden and this ties up men and equipment that are badly needed elsewhere. Perhaps some generous person will come forward with the comparatively small sum that will make this possible. Ample and convenient storage space is available on the ground and basement levels.

EDGAR ANDERSON

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The death of **Philip A. Conrath** of our Horticultural Council is a loss to the Garden world. His special gifts and wide interests gave him national prominence; his long associations with Mens' Garden Clubs brought him into contact with most of the outstanding amateur gardeners in the St. Louis area and many of the professionals. His quiet, courteous ways, his sympathetic interest in other people, his capacity as an organizer, resulted in scores of close friendships with garden-minded people. His remarkable artistic endowments, his experience in University and Medical School circles, widened and deepened his insights. With all his responsibilities, before techniques for showing groups of visitors through the Climatron had been worked out, he served thousands of people as the Garden's official (and unpaid) host. When other volunteer guides were kept away by emergencies, he could always be counted on to fill in, even though his schedule was already crowded. As a guide he was dignified, sympathetic (but politely firm if need be) and most effective. And this is only one of many ways in which he served the Missouri Botanical Garden effectively.

E.A.

# THE DYNAMICS OF LANDSCAPE

LAST SPRING'S course with this title studied the plants of our spring woodlands, meadows, and roadsides. It was planned particularly for people who have a place in the country (or the edge of it). The laboratories and lecture rooms were the woodlands, meadows, pastures, roadsides, gravel bars, and glades of the Garden's Arboretum at Gray Summit, in the edge of the Ozarks. The class learned how to study the interactions between the plants and animals that live there (including Man) and the way they, the sun, the air, the soil, the bedrock, and the rain affect each other.

It was practical enough so that those families with a place in the Ozark can spend money and effort more effectively. It was basic enough so that all of us (including the instructor) now go about the countryside with pleasure in our increasing understanding of it.

Our little class (it was strictly limited to 20) braved the raw spring weather of 1966 and came back informally in the heat of mid-June for the pleasure of working together as a group. It is planned to offer a similar course from late March to early May, 1967.

EDGAR ANDERSON

The "Dynamics" Course studying an unnamed variety of White Ash which grows on glades and other rocky places.

PHOTO—MARK PADDOCK

# AZALEAS FOR ST. LOUIS GARDENS

ELEANOR B. McCLURE

One of the highlights of the year, horticulturally speaking, has been the fabulous springtime bloom of azaleas and rhododendrons. This once-in-a-lifetime display of color was the result of exceptionally favorable weather in the past winter and spring. The abnormally mild winter was a real boon to both conifers and broad-leaved evergreens. Most plants suffered a minimum of winter burn and die-back of branches. Even the tender buds of azaleas and rhododendrons escaped injury.

The cool rainy weather in April also was appreciated by the broad-leaved evergreens. The profuse bloom that followed made many a city or suburban garden look like a bit of the Deep South, transported in full flower. The almost unbelievable color in one garden quite literally "stopped the traffic," as motorists slowed down to look at brilliant masses of flowers.

It was a pleasure, too, to see fine azaleas in so many gardens. A generation or so ago only a few pioneering horticulturists (like Mr. Leicester Faust and Mr. Clarence Barbre) were growing azaleas and rhododendrons. Now it is quite apparent that these fine evergreens are very much at home in many midwestern gardens.

This increase in the popularity of evergreen azaleas is well deserved, for they are among the most beautiful plants that can be grown in the St. Louis area. These winsome broadleafs mature gracefully and have a tidy habit of growth that gives them a surprising versatility as a landscape plant. Azaleas are well adapted to shade gardens, especially when there is an underplanting of bulbs, wild flowers, ferns, and myrtle. They are ever so beautiful in a traditional mass planting, but may also be used with fine effect in a Japanese garden or in a foundation planting of a contemporary house.

Moreover, despite some of the harsh things said about them, azaleas are not miffy, hard-to-grow plants. On the contrary, they are remarkably hardy and tolerant. Disappointment and failure can usually be traced to one of two mistakes on the part of the gardener: First, purchase of inferior plants or of varieties that are not hardy here; and second, lack of care in the selection of the site for the bed and in preparation of the soil.

Let's start by finding a proper location for the bed. Most azaleas appreciate at least partial shade and grow best when they have a northern or eastern exposure. If azaleas must be grown in an exposed spot, they should be protected by a windbreak of evergreens.

The preparation of an azalea bed need not be difficult or time-consuming. A few years ago I was pleased to find that the trial-and-error methods that I had worked out were in line with the recommendations of Frederick P. Lee in *The Azalea Book*.

According to Dr. Lee, it is unnecessary to make a deep bed, for azaleas are shallow-rooted plants that are most concerned about surface drainage. "If you have to plant in clay, incorporate copious amounts of organic matter into the top six inches of soil. Then grade down the surface so that water falls away from the plant."

In making a new bed our practice is to skim off the sod, so as to avoid having to weed out grass later on. (This sod makes a fine addition to the compost pile.) Then, after tilling or spading the top eight inches or so of surface soil, we cover the bed with a two- to six-inch layer of organic matter—depending on the available supply. Both sphagnum peat moss and black peat can be used, along with sawdust, leaf compost, and manure (despite the fact that animal manures are slightly alkaline).

For improved aeration we add a two- to three-inch layer of perlite, which may be obtained from a building supply firm. On top goes a camellia-azalea fertilizer used at the rate of four pounds per 100 square feet. All of these materials must be thoroughly incorporated into the soil. The completed bed should be elevated a few inches above the surrounding ground, with just enough slope to provide good surface drainage.

In recent years we have not bothered to make soil tests to check the acidity of our azalea beds, for the actual pH doesn't seem to be as important as the need for an exceptionally well drained, organic-rich soil. Although I do not recommend such treatment, I have one azalea that has grown from a small cutting to an exceedingly robust plant despite the fact that it has never been in acid soil but has enjoyed regular feedings of an ordinary 5–10–5 fertilizer, plus yearly applications of manure! This may, of course, be the exception that proves the rule.

Azaleas have such a dense, fibrous root system that they can be moved with ease and can be planted whenever the ground is workable. Early spring planting is probably most favorable, although I often move them in full bloom, to get some desired color effect.

I like to space the plants fairly close together, for azaleas seem to form a mutual protective society, and they grow best in congenial colonies. Since a plant may sometimes nearly double in size in a single season, this means that a bed will have to be thinned out after two or three years. Surplus plants can then be moved to a new bed. This is really not much trouble, for it is easy to lift and replant an azalea.

Since these broadleafs develop roots very close to the soil surface, the beds should never be cultivated. Instead, the plants should be protected with a "permanent" mulch of such organic matter as sawdust, wood chips, oak leaves, pine needles, redwood fibers, or the like.

Before mulch is applied, a fertilizer application should be made on the soil surface. The aim is not to feed the plants, but rather to protect them from nitrogen starvation that may come when the mulch materials are broken down by soil bacteria. Some gardeners prefer to mix a fertilizer with the mulch. For example, one pound of ammonium nitrate can be mixed into a bushel of sawdust.

Azaleas are not heavy feeders, and

it is quite possible to kill them with kindness. They do appreciate foliar feeding with a Ra-pid-Gro solution. A very light application of fertilizer or of iron sulphate may be used in early spring, and perhaps again in early July. A total of 2½ pounds per 100 square feet is sufficient. A yearly application of cottonseed meal or soybean meal may be used at the rate of three pounds per 100 square feet.

If a plant does show iron chlorosis (with leaves that turn pale green or yellow, while the veins remain dark green), the foliage may be sprayed with a solution made of one ounce of iron sulphate per gallon of water. If the azalea fails to perk up in a week or so, a solution of magnesium sulphate (Epsom salts) may be used in the same proportions, or a chelated iron (such as Sequestrene) can be applied as directed by the manufacturer.

Although careful bed preparation and planting are very important, they will not turn a poor azalea into a quality plant. "Bargain" plants are often disappointing. Each spring many azaleas are brought to St. Louis from the South, and among them are usually some varieties that are not hardy here. Many others suffer from winter burn and die back when subjected to severely cold weather. These varieties often make a very good recovery, however, even when they have been almost defoliated. This group includes such azaleas as Snow, Pink Pearl, Appleblossom, and Coral Bells. Another very beautiful one is a soft, soft pink, named Guy Yerkes.

Fortunately, there are many azaleas that have a surprising tolerance to cold. I have been growing a number of the "Sub-Zero" varieties recommended by Mr. James Wells, who specializes in broad-leaved evergreens at his nursery near Red Bank, New Jersey. We are also trying some beautiful hybrids originated by Mr. Peter Girard, at Geneva, Ohio. Chances are that new and hardier azaleas will be introduced in the near future.

The following list of azaleas that have proved hardy in this area is at best a partial one. *Those given an* (A) *rating seem to have super-cold tolerance.*

### RED AZALEAS

Hino Crimson deserves special mention, for it is probably the best that we have planted for year-round effect. A compact plant, with dense evergreen foliage that colors brilliantly in winter. It will grow in full sun in a foundation planting with a southern or western exposure. The deep red flowers are resistant to fading. (A)

Hinodegiri: probably the most popular azalea grown, but the blooms, which have a magenta cast, are considered inferior to those of Hino Crimson. (A)

Mikado: A tall, exceptionally hardy plant with spirea red blooms. (A)

Othello: Similar to Mikado, but the blooms have an orange cast. (A)

Stewartstownian: A Gable hybrid of dwarf habit. Has glossy leaves that turn bronze in winter. The deep red flowers are about the color of a ripe tomato. (A)

Sherwood's Red: Tall with rich red blooms.

Forest Fire: Somewhat taller than

Stewartstownian, and the flowers are a little lighter.

Hershey's Red: Flowers larger than Hino Crimson.

### PINK AZALEAS

Rosebud: Compact plant with glossy leaves and double pink flowers that do resemble small rosebuds. (A)

Fedora: Vigorous, tall-growing, with flowers described as deep phlox pink. (A)

Lorna: Very low-growing, with delightful double pink blooms. (A)

Hinomayo: An old variety but desirable for hardiness and its fine show of pink bloom. (A)

Boudoir: Very hardy, with blooms that are a deep watermelon pink. (A)

Betty: Robust-growing plant with large single flowers in bright rose. (A)

Helena: Similar to Rosebud but does not seem quite as hardy.

Louise Gable: A fine, soft rose but has not quite lived up to its rating in our garden.

Glory: Considered the hardiest salmon. Has handsome glossy leaves.

### WHITE AZALEAS

Wilhelmina Vuyk (also sold as Palestrina): An exceptionally robust, tall-growing plant with lustrous dark green leaves and large white blooms. Rated hardier than *Ledifolia alba* and is less troubled with infestations of azalea lace bug.

Polar Bear: A compact plant with shiny green leaves and good bloom. Not quite as handsome as Snow, but seems hardier.

### ORCHID AND LAVENDER AZALEAS

Mildred Mae: Compact, early blooming with lilac-colored flowers that are effective with pink and white varieties.

Corsage: Large, fragrant lilac blooms on plants that tend to grow quite tall. (A)

Orchid Lace: A medium tall azalea with good foliage and frilled white blooms with petal tips washed with lavender. (A)

### MAGENTA AND PURPLISH TONES

Amoenum: They say that magenta is immortal in the garden, and this applies to this old variety that seems as hardy as a shrub. It has small, glossy leaves and violet-red flowers. (A)

Sherwood Orchid: A never-fail variety that makes a very large plant and has red-purple flowers. (A)

Purple Splendor: Double purple blooms on spreading plant of medium height. (A)

Herbert: Almost a twin to Purple Splendor.

THE ORCHID COLLECTION of the Garden was enhanced this summer by the acquisition of two nice collections, consisting of some two hundred specimens of various genera. Some of these are duplications of plants already in our collections but nevertheless most welcome; others were new. We are hoping some of these plants will condescend to bloom for next year's Orchid Show, at which time due publicity will be given to them.

LAD CUTAK

The Garden's Scientific Staff photographed at the rear entrance of the Administration Building on May 24 1966, in the pleasant spring sunshine. All present except Edgar Anderson who was in Iowa that day. Left to right, on the upper level: Hugh C. Cutler, Walter H. Lewis, André Robyns. On the stairs: Owen J. Sexton. On the pavement: Kenneth O. Peck, Derek G. Burch, John D. Dwyer, David M. Gates, George B. Van Schaack, Frank F. Pershe, John Ridgway, Victor Muehlenbach.

A WELCOME VISITOR: This summer the Garden has profited from a three month visit by a young English scientist, Dr. Robert L. Jefferies. He has been here working with Dr. Gates and his students on problems of energy exchange in plants. Like Dr. Gates he is an ecologist, and is on the staff of the University of East Anglia at Norwich.

Dr. Jefferies has taken a particular interest in the plants and animals of serpentine areas where underlying rocks have such high concentrations of magnesium that their faunas and floras are recognizably peculiar. He is now equipping himself not only to study the interactions of these plants and animals with each other, but to measure accurately their reactions with the physical world around them, soil, water, atmosphere, radiant energy.

Dr. Jefferies proved to be not only a good listener, but also gifted in discussing other men's notions at the stage where they are beginning to be put together into theories.

E.A. & M.B.

Dr. David Gates, the Director, shaking hands with our first paying visitor at the Main Gate on the morning of July 15th. She was Miss Mary Ann Scott a counsellor at the Page Park YMCA, bringing five little boys to show them around the Garden. They were all under 13 and accompanied by an adult, so they got in free. The gentleman in the background was the next visitor in line, so he also had a special greeting from the Director.

PHOTO—C. JOHNSTON

## CHARGING ADMISSION

On July 15th, following an old recommendation of Henry Shaw's, the Garden began charging 25 cents admission at the Main Gate to all visitors over 12 years of age. Annual passes are also sold at the same place for $1.00. The increased revenue is badly needed to support the Garden's day-by-day operations and Mr. Shaw had the foresight to leave directions that it would be wise to charge admission when conditions made it necessary.

The change brings some indirect benefits. For over fifty years those in charge of the Garden have labored to make the public understand that we are *not* supported by the State of Missouri or the City of St. Louis. Charging admission drove home the truth as has nothing else. It also is decreasing vandalism and reducing litter, particularly large unsightly items such as newspapers, soiled rags, and big paper bags.

# THE "HERB LADIES" PROVIDE BOTH GAIETY AND MONEY

TO CELEBRATE its 25th Anniversary, the St. Louis Herb Society entertained the entire staff and officials of the Garden at a traditional European May Day party ("Mai-Bowle Fest") in the Floral Display House on the evening of May 20th. For all its quarter of a Century the activities of this group have been centered at the Garden. For over a year they had been raising money to present us with an appropriate tribute, a gesture of appreciation for years of encouragement and understanding.

Their President, Mrs. Eli Strassner, presented Dr. Gates with a check for $2,000 to begin the development of the walk between the Main Gate and the Museum as a "Fragrant Path" with sweet-smelling shrubs here and there and quiet places to sit. Dr. Gates spoke briefly about developments at the Garden. Then the Swiss-German Choral group of St. Louis ("Schweizer Maennen-Damen Chor") presented a beautiful and fascinating concert. They are St. Louisans of Swiss birth (or Swiss ancestry) who get together regularly to sing old traditional songs. They wore their traditional costumes (some of those worn by the women had been handed down from generation to generation).

Dr. David M. Gates, Director, thanking the St. Louis Herb Society for their gift and discussing plans for the Garden's further development.

PHOTO—C. JOHNSTON

Much of the program was for voices without accompaniment. It went all the way from classical church music of Palestrina to rollicking folk songs and drinking songs. The most unusual was a long and spirited yodelling song in parts of which some of the men chanted a deep background while a group of the women warbled rapidly in their high falsetto voices. It was obviously a nonsense song, even if you couldn't understand the words.

The two or three ladies whom practice had made perfect in this strange fluting seemed to enjoy such a glorious opportunity for showing off their technique, and had as much fun as the

Part of the Swiss German Choral Group (in their native costume) being directed through an intricate number.

PHOTO—C. JOHNSTON

audience. After the concert the May Bowl was served, a punch of sparkling white wine and fresh strawberries fortified with brandy, in which there mingled the distinctive flavor of fresh Sweet Woodruff ("Waldmeister") from the members' own gardens. At this point a small German Band began to play appropriate music and some of the audience joined with members of the choral society in singing informally until it was time to say good-bye. It was an evening to remember, a delightful blend of sophistication and innocence.

E.A.

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STAFF TRAVELS. Dr. Walter Lewis may not have taken any exotic trips out of the country this summer, but he did have a field trip in early summer that took him through five western states collecting Claytonia (spring beauties) for propagation in the Garden's experimental greenhouse as well as for the herbarium where there are specimens from some of the earliest exploring expeditions of the west. His work with them resulted in a Medical Grant from Washington University, one of the few given to anyone in the field of botany. It seems Claytonias are going through an evolutionary change which scientists seldom have the privilege of seeing at the cellular level. This change in cell structure is of interest to medicine because of its possible contribution in the fight against cancer. Dr. Lewis has also received a large grant through the Center for the Biology of Natural Systems, a newly created Federal project given to Washington University for research involving all areas of plant and animal life. With this a trailer laboratory has been set up between the administration building and the experimental greenhouse where both Dr. Lewis' students and Dr. Gates' students can have a fully equipped, well ventilated, and well lighted laboratory. Working space in the administration building is becoming more and more of a problem as the Garden continues to grow in importance as a botanical research and information center as well as a show place. So, until the new building is a physical fact, temporary measures such as the trailer lab are a necessity.

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Dr. John Dwyer, Curator of South American Phanerogams at the Garden, has just returned from his second field trip to Panama. Some 2,500 specimens were collected, 750 to be added to our herbarium collection (with whatever duplicates sent to the Garden) for exchange with other botanical centers. The trip was sponsored by the U. S. Army Tropical Test Center in Fort Clayton, Canal Zone, where Dr. Dwyer served as a consultant. The Test Center is carrying on extensive environmental studies and has built up a small tropical herbarium; most of the identifications were made here at the Garden by Dr. Dwyer, with Dr. Derek Burch and Dr. André Robyns contributing.

Dr. Dwyer collected in seven of the nine provinces of Panama including a 5-day trip in Darien with the Interoceanic Canal Survey Team of the U. S. Army Engineers.

On September 12–16 he will attend the Sixth Plenary Meeting of A.E.-T.F.A.T. (Association pour l'Etude Taxonomique de la Flora d'Afrique Tropicale) at the University of Uppsala in Sweden where he will participate in a panel discussion of floras and taxonomic revisions on a world-wide basis.

* * *

Dr. Derek Burch and his wife, Nancy, spent part of the summer in Derek's former home, London, England, where he was able to study herbarium specimens housed at the Royal Botanic Garden, Kew, and the British Museum. During August Dr. Burch traveled to Munich, Vienna, Geneva, Stuttgart, Frankfurt, Paris, Rotterdam, and Stockholm to observe the great European botanical gardens.

Dr. André Robyns and his family returned to their home in Louvain, Belgium, this summer but will return this fall for Dr. Robyns to continue his work on tropical plants for the Flora of Panama.

* * *

MR. PECK TELLS US HIS OWN STORY:

In early May, my wife and I had the opportunity to visit several institutions in the Chicago area and Milwaukee. At the Field Museum of Natural History, John Millar, Curator of Exhibits, showed us displays under way and most of the new ones. Many of the botanical exhibits had been reworked and are truly exciting. We also had a chance to compare notes on education programs with Miriam Wood, Curator of Education. A visit to the Morton Arboretum was equally rewarding. Since my last visit there, the Arboretum has built a beautiful new library which is headed by Mrs. Mary Moulton. In addition, there are also a new gift shop and tea room. We also talked with Richard Wasson, Head of education and Roy Nordine, propagator. We then visited Garfield Park and Lincoln Park Conservatories. John L. Lundgren and his staff took us through their display and growing houses. These Chicago conservatories are part of a large horticultural operation and are beautifully kept.

In Milwaukee, we visited the new Mitchell Park Conservatory which consists of three conical domes similar to the Climatron. One of these is for tropical plants, another for seasonal floral displays, and the third for plants of arid regions which is nearing completion. The domes are each 140 feet in diameter and 80 feet high at the center, a most impressive complex.

KENNETH PECK

* * *

A "candid camera" glimpse of last spring's successful introduction to growing Bonsai dwarf trees.

In the left foreground Mrs. Kay Hert, the instructor, gives the final touch to a young pine tree. In the background, the youngest member of the class and our Mrs. Panos (who was taking the course) talk things over with another student just out of sight at the right.
PHOTO—C. JOHNSTON

EAR-MUFFS IN SPRING, SALT PILLS IN SUMMER; Dr. Gates and his collaborators study energy in-put and out-take with the trees at the Garden. (See front cover.)

With marvelous new equipment supplied through government grants, the Garden itself, with its growing trees and shrubs, makes an ideal outdoor laboratory for Dr. Gates' rapidly developing studies of energy budgets in leaves. The heavy equipment was housed in a small laboratory fitted up in the basement of the Museum. Students and assistants raced back and forth with leaves and flowers. Lighter equipment was housed in the new Trailer Laboratory (adjacent to the Experimental Greenhouse) and carried back and forth to the trees as it was needed.

The program began in a small way when the very first trees began to leaf out this spring. It gathered momentum as more apparatus arrived along with more students and assistants to run it. During the pleasant June weather students and staff relaxed as they sat down by the trees they were studying and discussed their results. As the weather got hotter and they all got farther and farther into the program, the results got to be exciting just as the heat got record-breaking. Temperatures over a hundred were a welcome new opportunity, particularly when some of the leaves were being damaged and others were not. What are the water-cooling and air exchange systems of different kinds of leaves and how do they behave under stress? Much of the work was going on all day long in the area between the Shaw House, the Administration Building and the Museum. Early morning would frequently see the whole group hurrying up to Dr. Gates' office for a conference on the results that were coming in and new analyses of what they indicated.

It was a busy landscape for some weeks. There were scores of children in the free summer classes with Kenneth Peck and his teen-age and adult assistants. There were visitors to the Garden, mostly family groups touring the country and taking the curving paths from the Climatron to the New Rose Garden and the Shaw House, then circling back to the Main Gate. Even when all three of these enterprises were going full tilt, they cooperated happily with each other. Among the children, a few took a great interest in the scientific work, even some of the youngest, though they mostly ignored the casual visitors. E.A.

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NEIGHBORHOOD YOUTH CORPS. Cooperating with the Federal program for helping teenagers get summer jobs, the Garden has worked with 19 Corps members this summer. Most of them have been helping with the actual care of the plants. Three have been busy in the scientific and administrative part of the Garden. We thought BULLETIN readers might be interested in meeting them.

The Garden's Arboretum at Gray Summit has been more continually used for botanical study and instruction this season than ever before. Academically the students ranged from teen-agers and college students to gifted amateurs (as in the above photo of Dr. Anderson's class last May).

The ladies of the Historical Committee have rehabilitated and equipped the old brick mansion for the Director and his family. It already plays an important role in the Garden's operations, serving as a center for quiet conferences with small groups, to entertain distinguished guests and old friends, to integrate the active research of Dr. Gates' students and associates by informal round table discussion.

Most of the teaching and study is carried on out-of-doors in the Arboretum's meadows, pastures, gravel bars and woodlands.

PHOTO—M. PADDOCK

Charles Brown will be a senior this year at Northwest High School. He's interested in Secondary-Education Counseling, requiring a B.A. in Education and Social Work, for which he hopes to get a scholarship. He has fitted into a variety of jobs in the Director's Office, the Friend's Office and elsewhere in the Garden. The Garden will probably hire him during part of his spare time during the school year.

Norma Skaggs will be a junior at McKinley High School this fall, where she wants to study secretarial work. If she can get a scholarship she would like to go to college and major in business. Out of the 19 Corps members she was the only girl. She has been helping in the Director's office, in the Friends' Office, has helped with the children's summer Nature Study Program, and wherever else she was needed.

Melvin Wilson graduated from Vashon High School this last spring and has a scholarship for college this fall. He fitted in nicely as an assistant to the graduate students studying with Dr. Gates, principally Bruce MacBryde. Most of his work has been to help get an exact measure of the surface area of a young Austrian Pine near the Museum by counting and measuring the needles, branch by branch. Melvin says that from his summer experience he is more determined than ever to study biochemistry on the scholarship he received for Millikin University in Decatur, Illinois.

Melanie Brown

## GREEN LAWNS IN A HOT SUMMER

What's new at the Garden? Attractive long stretches of bright green turf in spite of the hot summer. This emerald carpet didn't just happen. At the end of the drought summer of 1936 the Garden began its studies of the *turf problem* in St. Louis. Twenty years later we began calling the city's attention to grasses and their peculiar problems. We gradually learned to adapt the improved grasses and grass-control techniques of the best golf courses to our special needs, our budget, and our annual supply of manpower.

Insofar as possible we have ever since been encouraging good grasses and discouraging weeds. Three years ago James Hampton, consulting with Raymond Freeborg, took over the supervision of our lawns and meadows. This spring (with weather excellent for grass and bad for weeds) gave us a head start. Effective feeding, disease control, and watering have grown our best looking turf in anyone's memory. All the oldtimers who have dropped in have commented on it. Visitors have raved about it. No wonder that when Raymond Freeborg and Kenneth Peck gave their course on Lawn Care this August, they had all the students they could easily accommodate.

E.A.

* * *

Gift to the Herbarium. Recently Miss Margaret and Miss Louise Carr donated $100 to the Herbarium Endowment Fund in memory of their uncle, Mr. Frank Wahl, who was an enthusiastic gardener. The interest earned from this fund brings to St. Louis rare and unusual plants for the herbarium collection and recently enabled us to purchase a set of 500 specimens from Zambia in Central Africa from the herbarium of Mrs. H. M. Richards, who is a resident in that new republic.

The entire staff of the herbarium is extremely grateful to the Misses Carr for this generous gift to the Endowment Fund.

Walter H. Lewis

How to raise better orchids for next winter. Two of the Garden's maintenance staff rebuilding the orchid growing houses during the summer: Jesse Mayhan and Roy Estep.
PHOTO—C. JOHNSTON

⁂

GRADUATE STUDENTS BUSY ALL SUMMER. Six Graduate Students have been carrying out research in the Garden, most of them for the entire summer. Ronald G. Alderfer has been working under Dr. Gates' direction since the very first leaves appeared in the early spring. More recently he has had as a technical assistant, serving as a volunteer, Mrs. G. J. Samuelson.

⁂

Another of Dr. Gates' graduate students, Bruce MacBryde, was working on the same general program. Unlike the others, he spent most of his time on one tree, rather than in studying leaves on different trees. See pp. 16, 18.

⁂

Olga Herrera of Ecuador, working towards a Master's degree in St. Louis under Dr. Dwyer of St. Louis University, Research Associate in the Herbarium.

⁂

Joan Nowicke is continuing her work toward a Doctorate with Dr. Lewis. This summer much of her time has been taken up with an intensive study of the pollen of two families of flowering plants.

Raymond Altevogt, who is studying alfalfa and its wild relatives under Dr. Anderson's general direction, worked intensively in the Herbarium and Library until the first of July when he departed for Iowa where he will study these same plants in the experimental plots of the Pioneer Corn-Breeding Company.

---

Kenneth Robertson arrived in the early summer to work towards a Ph.D. with Dr. Lewis. He comes here from the University of Kansas with an undergraduate major and an M.A. in Botany.

M.B. & E.A.

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THIS YEAR'S WEATHER has played an important part in the growth of the Amazon water platters or Victorias. Due to the long cool spring the lilies were set outdoors two weeks later than usual. The night temperatures, after planting, continued to be low so the growth was slow. Victorias require water temperatures of at least 80 degrees F. for the best results. Because the Victorias were retarded on account of cool weather their usual size (five foot diameter for each leaf) will not be attained, although the hot spell in July pepped up the growth.

LAD CUTAK

## OLD JAPANESE STONE LANTERN ON DISPLAY

SOME years ago the Garden was given two beautiful stone lanterns, which originally came to St. Louis as part of the Japanese Garden at the World's Fair. This larger one was too heavy to move about readily in setting up displays. Eventually it was moved near the Cleveland Avenue Gate House. The hardy Chinese Bamboo, *Phylostachys aureosulcata,* was established nearby. This graceful species is taller than most men but not stout enough for fishing poles. A tiny variety, one of the commonest in Japanese Gardens, was planted on the other side. Early last spring a narrow sign roughly like those used in Japan was placed just off the walk.

In much of Japan snows are light and do not linger long. These lanterns are designed to display even a light powdering. It then makes a pleasant contrast with pines and other evergreens.

The sign has so increased public interest that this summer a small viewing area was paved between the walk and the lantern. The display now attracts many visitors. We are now planning to place a vigil light inside and light it on dark, snowy afternoons for the delight of those who make winter pilgrimages around the Garden to see it all blossomed out with new snow.

EDGAR ANDERSON

PHOTO—C. JOHNSTON

For eight weeks this summer the Garden swarmed with children and young people studying Natural History under the free instruction program provided by the Pitzman Fund. Except when it rained or when they had a short illustrated lecture, it was all in the open air. They ate their lunches and carried on class work at tables and benches in the shade. The children in the picture are learning about plants under the wide-spreading branches of a hundred-year-old Ginkgo. Carol Kohler, the teenage girl who is teaching one of the groups of Juniors, is an apprentice. Mr. Peck's seven apprentice teachers were outstanding students in previous summers. The oldest of these are now college students, majoring in biology and making excellent records. They help set up the equipment before the course starts, supervise the lunch hours, and make everything ship shape again when the summer classes are over. The lifetime friendships that are developing among these brilliant and lively young people is one of the finest results of the whole program.

* * *

## COMING EVENTS AT SHAW'S GARDEN

September 17. Children 7–16 years. Free. Kenneth Peck, 10:00 A. M. Museum Building. Table-Top Greenhouses.

September 24. Children 7–16 years. Free. Kenneth Peck, 10:00 A. M. Museum Building. Little Round Green Things. (Algae).

September 24–26. Dahlia Show — Greater St. Louis Dahlia Society — Floral Display House. Saturday 4:00 to 5:00 P. M.; Sunday 9:00 to 7:00 P. M.; Monday 9:00 to 5:00 P. M.

September 26. Friends of the Garden only. Kenneth Peck, 8:00 P. M. Museum Building. Plant Propagation from Cuttings.

October 1. Children 7–16 years. Free. Kenneth Peck, 10:00 A. M. Museum Building. How to Make a Terrarium.

October 8. Lecture and Demonstration. Robert J. Gillespie, 10:00–3:00. Orchid Greenhouse. Plants Under Artificial Light.

October 8. Children 7–16 years. Free. Kenneth Peck, 10:00 A. M. Museum Building. Planting Bulbs.

October 11. First Lecture, Evening Section. C. Barbre, K. Peck, 8:00–9:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

October 13. First Lecture, Afternoon Section. C. Barbre and K. Peck, 1:00–2:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

October 14. Fall Harvest Sale. St. Louis Herb Society, 10:00 A. M.–4:00 P. M. At Herb Garden and Museum.

October 14–16. Annual Taxonomic Symposium — Systematics and Natural Areas. Museum and Park Building (Display House Complex).

October 15. Children 7–16 years. Free. Kenneth Peck, 10:00 A. M. Experimental Greenhouse. Fall Colors.

October 18. Second Lecture, Evening Section. C. Barbre and K. Peck, 8:00–9:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

October 20. Second Lecture, Afternoon Section. C. Barbre and K. Peck, 1:00–2:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

October 22. Children 7–16 years. Free. Kenneth Peck, 10:00 A. M. Museum Building. Fall Treasure Hunt.

*For further information or to register for courses, phone, Monday*

## SEPTEMBER — OCTOBER — NOVEMBER, 1966

October 24. Friends of the Garden Only. Paul A. Kohl, 8:00 P. M. Floral Display House. Preparation of a Floral Display. Use Alfred Avenue Entrance and Parking Lot.

October 25. Third Lecture, Evening Section. C. Barbre, K. Peck, 8:00–9:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

October 27. Third Lecture, Afternoon Section. C. Barbre and K. Peck, 1:00–2:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

October 29. Children 7–16 years. Free. Kenneth Peck, 10:00 A. M. Museum Building. Forests of the Rocky Mountains.

November 1. Fourth Lecture, Evening Section. C. Barbre and K. Peck, 8:00–9:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

November 3. Fourth Lecture, Afternoon Section. C. Barbre and K. Peck, 1:00–2:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

November 5. Children 7–16 years. Free. Kenneth Peck, 10:00 A. M. Museum Building. Bird Feeders.

November 5. Preview—Friends of the Garden Only. 7:00–9:00 P. M. Enter Main Gate or Service Gate on Alfred Avenue.

November 5–7. Garden Gate Shop Special Sale. Floral Display Greenhouses. 5:00–7:00, Friday; 10:00 A. M. to 5:00 P. M.; Saturday, 10:00 A. M.–5:00 P. M., Sunday.

November 6–27. Chrysanthemum Show. Floral Display House—Weekdays, 9:00 A. M. to 5:00 P. M.; Sundays, 9:00 A. M. to 7:00 P. M.

November 8. Fifth Lecture, Evening Section. C. Barbre and K. Peck, 8:00–9:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

November 10. Fifth Lecture, Afternoon Section. C. Barbre and K. Peck, 1:00–2:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

November 12. Children 7–16 years. Free. Kenneth Peck, 10:00 A. M. Museum Building. Fun with Fruit.

November 19. Children 7–16 years. Free. Kenneth Peck, 10:00 A. M. Museum Building. Desserts.

November 26. Children 7–16 years. Free. Kenneth Peck, 10:00 A. M. Museum Building. Winter Window Vegetable Gardens.

*through Friday, 9:00 A. M. to 5:00 P. M., TOwnsend 5-0440.*

PHOTO—C. JOHNSTON

ONE of the youngest juniors takes things into his own hands and gets right up on the table to lay out his laboratory work properly. Kenneth Peck, who heads the educational program, is a remarkable teacher, understanding the special problems of all ages of students from retired persons in their eighties to those who have just turned six. It is wonderful every summer to see how quickly he and his staff make these littlest tots feel at home. Bewilderment, panic, belligerence, homesickness, rebellion, scratches, bee-stings and other minor tragedies are sympathetically and effectively dealt with. By the second week these same youngsters are self-reliant, happy in their work, and a pleasure to have around the place.

◆

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George B. Van Schaack, Librarian

The Missouri Botanical Garden is a fund member of the Greater St. Louis Fund for Arts and Education.

# SOME FACTS ABOUT SHAW'S GARDEN

The Missouri Botanical (Shaw's) Garden was established in 1859 by Henry Shaw, a St. Louis businessman, to be controlled by a Board of Trustees for the public benefit. The Garden is a non-profit institution which receives no support from the city or state, depending on the income from the Shaw estate supplemented by contributions from the public.

The old stone walls and cast-iron fences, the Linnaean House, the Museum Building, the part of the Administration Building which was Shaw's Town House, relocated in the Garden in 1890, and the Tower Grove House, his country home, all date from Mr. Shaw's time. The Main Gate and display and growing greenhouses are recent or before World War I. The Climatron, opened in 1960, is the world's first geodesic dome climate-controlled greenhouse and contains the Garden's main tropical collections.

## Hours

The Garden—70 acres—is open every day of the year except Christmas and New Year's. For the Main Entrance, grounds, Climatron, display greenhouses and Floral Display House:

| | |
|---|---|
| May 1 through October | 9:00 A. M. to 7:00 P. M. |
| November 1 through April 30 | 9:00 A. M. to 5:00 P. M. |
| (Sundays and Holidays | 9:00 A. M. to 7:00 P. M.) |

For Tower Grove House:

| | |
|---|---|
| May 1 through October 31 | 9:00 A. M. to 5:00 P. M. |
| November 1 through April 30 | 10:00 A. M. to 4:00 P. M. |

The Display House presents four seasonal displays: November, Chrysanthemums; December, Poinsettias; February, Orchids; Spring, Lilies and other flowers. During the year are other shows, competitions and festivals sponsored by various Garden Clubs and Flower Societies.

Courses in Botany and Horticulture for adults are conducted by the Garden staff. Children's nature classes are provided free Saturdays from mid-September to early June. A special nature program is held during the summer. Information on these activities is published in the Bulletin or may be had by mail or phone. The scientific activities of the Garden are integrated with those of Washington University.

In 1926 an Arboretum—1600 acres—was established at Gray Summit, Missouri. Foot trails and roads pass through the Arboretum and are open to visitors from April 1st to May 15th.

The Garden Administration Building is located at 2315 Tower Grove Avenue, and the Garden's main entrance is at Tower Grove and Flora Place. The Garden is served by both the Sarah (No. 42) and the Park-Southampton (No. 80) city bus lines.

Persons interested in helping to support the Garden and taking part in Garden activities are urged to do so through the "Friends of the Garden." Information may be obtained from the Main Gate or by mail or phone.

Phone TOwnsend 5-0440

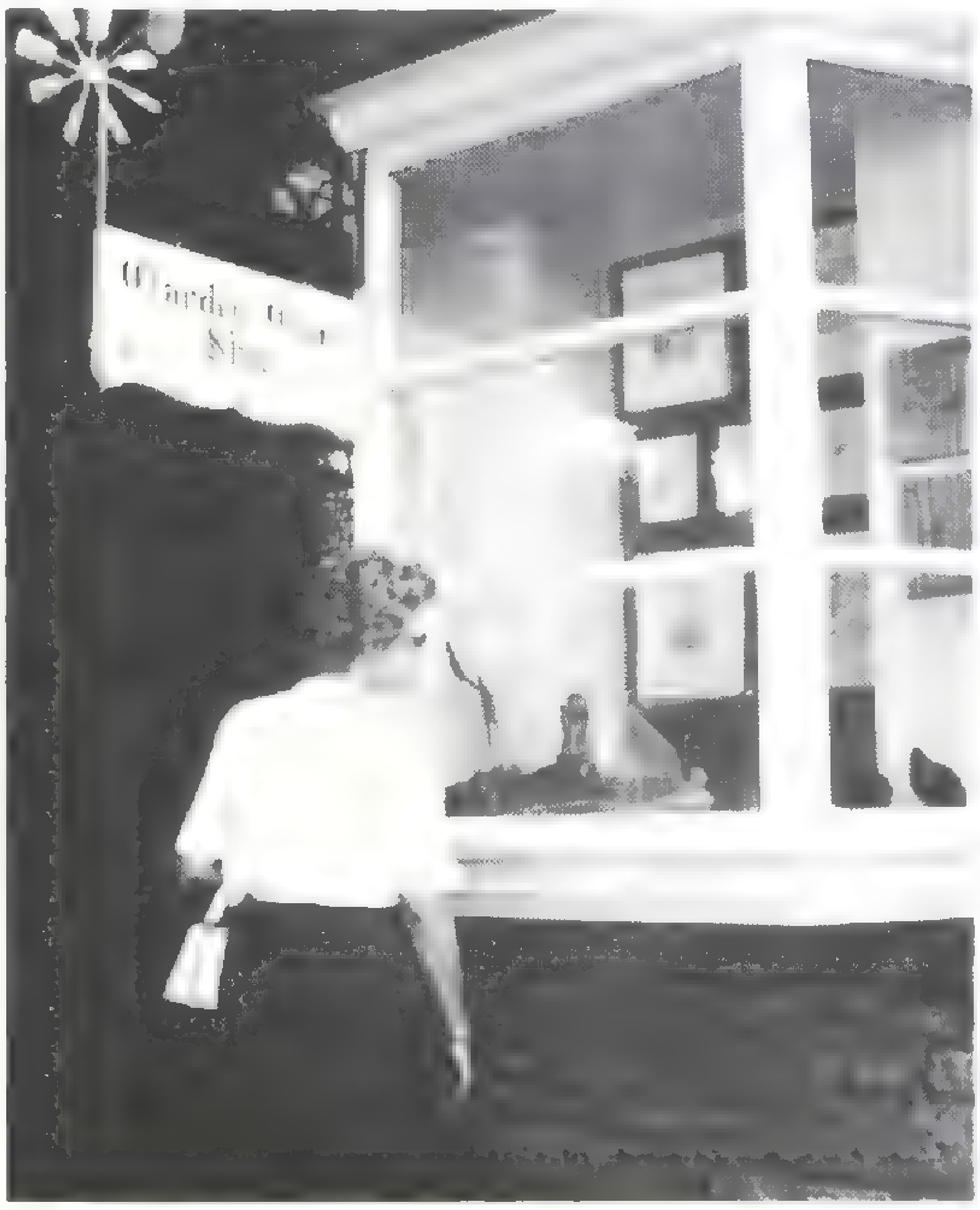
# MISSOURI BOTANICAL GARDEN

# *Bulletin*

October 1966
Volume LIV
Number 8

FLOWER SHOW PREVIEWS

OPEN AIR CONCERTS



GARDEN GATE SHOP

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* * *

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Missouri Botanical Garden Bulletin

Vol. LIV No. 8 October 1966

# FALL PLANTING FOR SPRING BEAUTY

ELEANOR B. McCLURE

By official legislative decree, the first week in October has been designated "National Spring Garden Planting Week." In introducing this bill, Senator Warren G. Magnuson of Washington said: "What we must have is a beautification program that includes in its scope every private home dwelling in our country, and, in Mrs. Johnson's words, 'a citizenship that cares.' "

Selection of the fall period as the ideal time to plant lawns, shrubs, trees, and bulbs for springtime beauty can certainly be endorsed by good horticulturists in this mid-Mississippi Valley area. Year by year there has been greater emphasis on the importance of planting in the autumn months.

Actually, we can think of the fall planting season as being divided into two definite periods. The first six weeks (until mid-October or slightly later) is a favorable time for planting shallow-rooted plants like grass and perennials. Early planting can also be recommended for broad-leaved evergreens, for this gives them time to become at least partly established before the advent of the first deep freeze.

Deciduous trees and shrubs, on the other hand, are best moved in late fall, after they have shed their leaves and become dormant. Although these plants may seem to be "sleeping" in the long winter months, their roots may grow actively during periods of mild winter weather. Fall planting of these ornamentals offers a great advantage, therefore, for they have time to develop new feeder roots. The plants are better prepared for the first rush of spring growth. They are also less subject to damage in the hot windy weather that often arrives in early spring, for their "water works" will be operating with some degree of efficacy.

Some plants may be moved almost equally well in either early or late fall. Conifers like pines and spruces, for example, can be moved in September or October, for they are nearly dormant at that time. As there is a comparatively small water loss from the narrow needles, they may also be transplanted in late fall, and even during the milder spells in the winter. Many arborists, in fact, handle these evergreens like deciduous trees and will break a frozen crust of soil for winter planting.

Hardy bulbs can also be planted at any time when the ground is not frozen. It is certainly easier for the gardener to plant tulips, crocuses, and daffodils when the weather is relatively mild. It is probably an advantage for the bulbs, too, for they can make substantial root growth in early fall. Hardy lilies may not be available until November. All of these bulbs may be planted in late fall, as long as it is possible to dig holes to the proper depth.

All ready to start? Then let's begin with the first of the gardener's fall tasks, the renovation of the lawn. While early September is the most favorable time, lawns may still be fed and seeded in October. As a short cut, it might be advisable to use hulled bluegrass and thereby save two to three weeks of germinating time. Lawns should be encouraged also by thorough, deep watering in these autumn weeks. This will give the bluegrass a chance to grow rapidly at a time when most of the weeds have shut up shop for the season.

Perennial beds may be renovated in September and October. Heavy clumps of spring and summer flowering perennials may be lifted and divided—for example, Shasta daisies or hardy phlox. And it is not too late to tackle crowded plantings of hemerocallis and bearded irises, or to add some of the new and more glamorous hybrids now available.

In shopping for iris, hemerocallis, or peonies, it is best to buy from a grower who specializes in these winsome flowers. The new bearded irises are ruffled beauties that come in a remarkable color range. Many of them have built-in weather resistance and can endure both hot sunshine and pelting rains.

The modern hemerocallis is a delightful flower that bears small resemblance to the orange-colored, weedy plant that has escaped from our gardens to grow prolifically along country roadsides. For one thing, the new hems have vastly improved form, some of them resembling an amaryllis in shape, while others have exotic narrow, twisted or curled "spider" type blooms. There are varieties with ruffled petals, and some seem lightly dusted with gold.

You may select new hems in a wide range of yellows, from near-white to deepest gold, and many of them have a touch of chartreuse at the throat. Then there are delightful pink and rose shades, as well as bright red, deep crimson, maroon, and purple.

Our modern day-lily hybrids tend to bloom over a very long period, many of them flowering for six weeks or more. A few are consistent rebloomers. I remember seeing a row of yellow day-lilies called Illinois blooming abundantly in early September.

One precaution: I'd try to select varieties that are night bloomers. It is really disappointing when the blooms shrivel up in late afternoon.

Peony plants may be grown for many years before they must be lifted and divided. Although it is possible to "ball" a peony and move it like a small shrub, this method may result in poor growth. Usually it is best to separate the roots into several husky divisions.

After digging a peony, wash the dirt off the roots, and then let the plant stand in a shaded spot for a few hours. Those large fleshy roots will then be less brittle and can be separated with a minimum of breakage or damage. After cutting away diseased portions, select the sturdiest roots for replanting — preferably sections that have four to six plump buds that are the forerunners of next year's growth.

These wonderful perennials grow best in an organic-rich, well drained bed. Since they are to live in one spot for many years, it pays to devote extra care to soil preparation at planting time. Here is a good procedure: First work the soil to a depth of 9 to 12 inches. Then spread on a 3-inch layer of perlite, plus 2 to 4 inches of organic matter—compost, partly rotted leaves, rotted manure, or peat moss. Add a balanced chemical fertilizer at the rate of four pounds per 100 square feet, and superphosphate at about half that rate. Superphosphate is cheaper than bone meal, and, since it is readily available to the plant, it is more effective. All these materials should be thoroughly incorporated into the soil.

Even after the bed has been prepared, some extra work is needed, for each new root should have a "bushel-basket" hole. Dig out the soil to a depth of 18 inches or more, removing any hardpan clay. Then partly fill with the top-soil mix, mounding it in the center to support the crown of the plant. Let the roots reach deep into the soil, but hold the crown so that the buds will be about two inches below the surface. Add topsoil, firming it around the roots, and then water well, to settle the earth. Cover to ground level with topsoil, and then mark the spot with a long label or with a pruned tree branch. Finally, add a heavy mulch—three inches or more of sawdust, compost, partly rotted leaves or other organic matter.

New peony divisions, of course, also deserve this special treatment. It is best to plant them as soon as possble, so that feeder roots can be established before the ground freezes. Very late planting may result in some losses, for the new roots have a tendency to rot in cold, wet soil.

Double peonies are among the showiest of garden flowers. Among the varieties that make massive, fluffy balls are such fine pinks as Ella Christiansen, Martha Bulloch, Mons. Jules Elie, Myrtle Gentry, and Mrs. Franklin D. Roosevelt. Henry Sass, Le Cygne, and the old Festiva Maxima are all good whites. Among the fine reds are such varieties as Kansas, Karl Rosenfeld, Phillipe Revoire, and the distinctive Mighty Mo.

Single peonies or the Japanese types often give better effect in the garden. As a rule, they carry their flowers well above the foliage, and the plants need less support. They also have better weather-resistance.

Japanese peonies have broad guard petals which act as a cup to the finer petals in the center. Among decorative varieties are Ama-No-Sode, which has petals in bright rose and a center of chamois yellow, edged with gold.

The most beautiful Japanese peony and, in fact, one of the loveliest of all peonies, is Isani-Gidui, which has crinkled petals in purest white in a center of gold. Among good reds are Nippon Beauty, Nippon Gold, and Sword Dance. An older but excellent Japanese peony is Midado.

Among the single peonies we can recommend such beautiful whites as Cygnet, Le Jour, and Krinkled White. Seashell is a bright pink, and President Lincoln is a rich, lustrous red.

## 1966-67 FRIENDS FLOWER PREVIEW PARTIES

THE Women's Executive Board of the Friends of the Garden is delighted to announce that 1966-67 will see another series of Friday evening flower show preview parties for the Friends of the Garden (by invitation only).

They will be as follows:

*November 4, 1966* — Chrysanthemum Show, modeling by Saks Fifth Avenue. Refreshments by Cruse Wines.

*December 2, 1966*—Poinsettia Show, modeling by Leppert Roos Furs. Music and refreshments.

*February 3, 1967*—Orchid Show, modeling, music and refreshments courtesy of Famous Barr Company.

*March 31, 1967* — Spring Flower Show, modeling by Montaldo's. Refreshments and music.

As in the past, all these parties will be given in the Floral Display House between 5:30 and 7:30 on Friday evenings. The invitations will be mailed at least two weeks in advance and each invitation admits two people. This year let us remember that we do have a lighted parking lot in the back entering via Alfred Avenue as well as parking on Flora Boulevard (either side) just opposite the Main Gate, which will be well-lighted and policed. And our new Park building complex just to the north of the Floral Display House makes it possible to have comfortable moving space for all Friends attending.

## REMINDER - REMINDER

THE last of the 1966 free lectures for members of the Friends will be given:

*Monday, October 24*—8:00 P. M.—New Growing Houses; enter Alfred Avenue Gate, use big parking lot, and come in by small door near big truck entrance.

*Preparation of a Floral Display.*

Speaker—Paul Kohl.

Lecture and slides to illustrate planning and producing floral displays at the Missouri Botanical Garden.

The Garden staff and the Friends of the Garden Executive Board would greatly appreciate some comment from all of you as to the value of the lectures that were given this year, of pertinent topics, and if you think we should continue this service to Friends. Write or phone the Friends' Office, TO. 5-0440 and give Mrs. Gleason your opinions.

## HELP!

When new members join the Friends of the Garden, they ofttimes are not aware of the fact that joining this organization is not only a matter of signing up and sending in a check, but it affords one with a real opportunity to participate in the social, educational and working activities of the Missouri Botanical Garden.

By working activities we mean the many volunteer services that can be rendered through the Friends of the Garden organization.

First, the lovely Garden Gate Shop needs volunteer sales personnel who can give as much as one day a week or as little as one day a month. The shop is open from 10:00 A. M. to 5:00 P. M. seven days a week—so pick your day. Mrs. Edwin F. Stuessie, the Shop Manager, says it takes only a short time to learn the location of all the colorful items, which in essence, sell themselves. The wide windows of the shop overlook the beautiful lily pools and outdoor flower displays, which make working conditions a pure delight.

Second, the Friends of the Garden Office needs "lickers," "stuffers," "looker-uppers" or any type talent that could be useful in the paper end of the Friends organization. The Friends' Office is a delightful spot in the old town house of Henry Shaw (Administration Building) decorated with antique furnishings as well as necessary office equipment. Again, as much as one day a week or as little as one day a month would give a real "shot in the arm" to the tremendous volume of work that goes through this office, which is open from 9 to 5 Monday through Friday under the guidance of Mrs. Leslie Gleason, Executive Secretary.

In addition to these direct Friends' activities, we can and should as members of the Friends try whenever possible to take part in promoting our fine organization to our friends and new residents of St. Louis. Even though the male members of our group cannot give of their time during the day because of business, they can be our "ambassadors of good will" by promoting the work we do to help Shaw's Garden. Friends' invitation brochures and the new Missouri Botanical Garden color brochure are available (with counter stands) to anyone who calls the Friends' office TO. 5-0440. If you have the name and address of a prospective member call Mrs. Gleason, Executive Secretary, and she will be glad to mail them all available information. Let's try to make 1966-67 our biggest membership year in the history of the Friends.

## HAPPY ANNIVERSARY

On September 30, the Garden Gate Shop celebrated its first anniversary in its new location, under its new management and with its new face. During its first year the shop has had its ups and downs and trials and errors, but as shown by its fiscal year check amounting to $11,010.06 presented to the Garden July 1, it has been an overwhelming financial success. But quite as rewarding has been the response it has received: Out-of-town visitors, St. Louis residents, and long-time supporters of the Missouri Botanical Garden.

In 1964 the Women's Association, with Mrs. Frank Vesser as Chairman, opened the first such shop in one of the rooms of the Tower Grove House. It sold souvenirs, imports, handmade articles and gardening accessories in keeping with the dignity of the Shaw mansion. However, the lack of sufficient space, along with the distance from the Main Gate and a decision to combine the front gate book and information center with the shop, led to its present size and location at the south side of the Main Gate entrance. Mrs. Edwin Stuessie took over as full-time manager in August of 1965 and the new shop committee of the Friends of the Garden was most ably led by Mrs. John Hayward. Under Mrs. Hayward's untiring direction, assisted by Mrs. John Wallace and the Women's Executive Board, the shop blossomed forth into one of the most beautiful and interesting gift centers in the city. In July this year Mrs. William Robinson took over as Chairman for 1966-7.

An opportunity for a first hand sampling of what the shop has to offer will be given all members of the Friends of the Garden at the Chrysanthemum Preview Party on Friday evening, November 4th. Booths will be set up in the Amatuer Display House, presenting for your viewing and purchase, Christmas decorations: trees, ornaments, bric-a-brac; stationery, books and prints; gift items of many styles and types; garden accessories including a Shaw's Garden first—an ivy trainer in the shape of a large bunny rabbit. These booths will be open from 5:00 P.M. to 7:30 P.M. the night of the Preview and from 9:30 to 5:00 on the weekend. On Monday all stock will be returned to the shop.

All in all one must pay a visit to the shop itself to see the outstanding selection of lovely items which have recently been added to the fine line of gifts carried at the Garden Gate. Christmas shopping is easy if you select from the following: children's Christmas trees dancing with little ceramic figures, colorful Victorian ornaments, and believe it or not, Christmas lights in the shape of fruits! For the adults on your Christmas list there are holiday serving plates from Italy, sterling silver flower charms, bird and flower trivets in natural colors by Walter Brockmann of St. Louis, flower printed pillows from Denmark and specially treated Mexican wooden serving bowls for hot or cold foods. A new fad to hit the gift-market is items made of papier mâché—boxes, mirrors, banks and the like. Add to all this a complete line of books: gardening, flower arranging, herb cookery, etc. Your entire gift list will be checked off.

Bring your friends and come see for yourself any day between 10 A. M. and 5 P. M.

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Mrs. Eric Bernays
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Mr. and Mrs. Samuel C. Davis
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Mrs. F. L. D[illegible]
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Mr. Lawrence N. DePew
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Mr. Marcel D[illegible]
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Mr. and Mrs. Martin D[illegible]
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Mrs. Howard C. D[illegible]
Miss [illegible] D[illegible]
Mr. and Mrs. J. R[illegible] D[illegible]
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Mr. and Mrs. [illegible] [illegible]
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Mrs. L. B. D[illegible]
Mrs. F. L. Dinsmore
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Mrs. H. D[illegible]
Mrs. G[illegible] D[illegible]
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Mrs. [illegible] B. Dodson
Dr. and Mrs. James F. D[illegible]
Mr. and Mrs. Walter A. D[illegible]
Mr. John F. D[illegible], Jr.
Mrs. W. M. D[illegible]
Mrs. Wm. F. D[illegible]
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Mrs. Robert B. Dunford
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Mr. Arthur A. Dunn, Jr.
Mr. and Mrs. Paul Dunn
Mrs. William M. Dyer
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Mr. and Mrs. Charles J. Eckrich
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Mr. and Mrs. John Eigel
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Chancellor & Mrs.
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Mr. and Mrs. Donovan Eller
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Miss Gladys Epps
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Mr. and Mrs. LeRoy A. Erickson
Mrs. George Erker
Mrs. R. C. Ermeling
Dr. and Mrs.
H. Cappel Eschenroeder

# COMING EVENTS AT SHAW'S GARDEN

October 1. Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. How to Make a Terrarium.

October 8. Lecture and Demonstration. Robert J. Gillespie. 10:00–3:00. Orchid Greenhouse. Plants Under Artificial Light.

October 8. Veiled Prophet Queen's Reception for School Children. Tower Grove House. 3:00–5:00 P. M.

October 11. First Lecture, Evening Section. C. Barbre, K. Peck. 8:00–9:00 P. M. Experimental Greenhouse. Propagating from Cuttings.

October 13. First Lecture, Afternoon Section. C. Barbre and K. Peck. 1:00–2:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

October 14. Fall Harvest Sale. St. Louis Herb Society. 10:00 A. M.–4:00 P. M. At Herb Garden and Museum Building.

October 14–16. Annual Taxonomic Symposium — Systematics and Natural Areas. Museum.

October 15. Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Experimental Greenhouse. Fall Colors.

October 18. Second Lecture, Afternoon Section. C. Barbre and K. Peck. 8:00–9:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

October 20. Second Lecture, Afternoon Section. C. Barbre and K. Peck. 1:00–2:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

October 21. Piano Concert; Joseph Klein. Sponsored by Women's Chamber of Commerce. Floral Display House. 8:00 P. M.

October 22. Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. Fall Treasure Hunt.

October 24. Friends of the Garden Only. Paul A. Kohl, 8:00 P. M. Floral Display House. Preparation of a Floral Display. Use Alfred Avenue Entrance and Parking Lot.

October 25. Third Lecture, Evening Section. C. Barbre, K. Peck. 8:00–9:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

October 27. Third Lecture, Afternoon Section. C. Barbre, K. Peck. 1:00–2:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

October 29. Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. Forests of the Rocky Mountains.

November 1. Fourth Lecture, Evening Section. C. Barbre and K. Peck. 8:00–9:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

November 3. Fourth Lecture, Afternoon Section. C. Barbre and K. Peck. 1:00–2:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

November 4. Preview. Friends of the Garden Only. 5:30–7:30 P. M. Enter Main Gate or Service Gate on Alfred Avenue.

## OCTOBER — NOVEMBER — DECEMBER

November 5. Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. Bird Feeders.

November 5–7. Garden Gate Shop Special Sale. Amateur Display Greenhouses. 5:00–7:00, Friday, Saturday, Sunday.

November 5–27. Chrysanthemum Show. Floral Display House. Weekdays, 9:00 A. M. to 5:00 P. M.; Sundays, 9:00 A. M. to 7:00 P. M.

November 8. Fifth Lecture, Evening Section. C. Barbre and K. Peck. 8:00–9:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

November 8. Winter Botany. Tree Study. First Session. Edgar Anderson and Kenneth Peck, 7:30–10:00 P. M. Museum Building. Limited to 20 people.

November 10. Fifth Lecture, Afternoon Section. C. Barbre and K. Peck, 1:00–2:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

November 12. Children 7–16. Free. Kenneth Peck. 10:00 A. M. Museum Building. Fun with Fruit.

November 15. Winter Botany, Second Session. Edgar Anderson and Kenneth Peck. 7:30–10:00 P. M. Museum Building.

November 19. Children 7–16. Free. Kenneth Peck. 10:00 A. M. Museum Building. Deserts.

November 22. Winter Botany, Third Session. Edgar Anderson and Kenneth Peck. 7:30–10:00 P. M. Museum Building.

November 26. Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. Winter Window Vegetable Gardens.

November 29. Winter Botany, Fourth Session. Edgar Anderson and Kenneth Peck. 7:30–10:00 P. M. Museum Building.

December 2. Preview. Poinsettia Show—Friends of the Garden Only. 5:30–7:30 P. M. Enter Main Gate or Service Entrance on Alfred Avenue.

December 3, 1966—January 8, 1967. Poinsettia Show. Floral Display House. Weekdays, 9:00 A. M. to 5:00 P. M.; Sundays, 9:00 A. M. to 7:00 P. M.

December 3. Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. Insectivorous Plants.

December 6. Winter Botany, Fifth Session. Edgar Anderson and Kenneth Peck. 7:30–10:00 P. M. Museum Building.

December 10. Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. Making Christmas Cards.

December 17. Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. Christmas Wreaths.

December 31. Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. Nature Movies.

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Mrs. G. L. Evans
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Mr. and Mrs. O. D. Evans
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Miss Rose L. Evertz
Mr. and Mrs. L. Rumsey Ewing
Dr. C. H. Eyermann
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Mrs. Edward Fehlig
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  James Hudson Jones
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  M. Alexander Jones
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Dr. and Mrs. Michael Karl
Mr. Louis E. Kassing
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Mr. and Mrs. Henry C. Kendall
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Miss Florence Leschen
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Mrs. Marjorie F. Lesser
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Mr. and Mrs. Meyer Levy
Mr. and Mrs. Willard L. Levy
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# BOTANICAL GOSSIP

## FIELD GARLIC

OUR PESTS somehow do not seem quite so noxious when we call them by name. The European field garlic *(Allium vineale)* is a case in point. Its blue-green leaves and stems stand stiffly erect and keep their color during the winter. In some forms it bears nothing but flowers; in some, nothing but little bulbs in place of the flowers. Commonest of all is the double-threat form which has flowers and bulblets side by side. The name *vineale* which means "of the vineyard" indicates the kind of places in which it is most characteristically found. It is resistant to many herbicides and in the South, where it is even more of a nuisance in lawns than in St. Louis, it is sometimes controlled by a tiny squirt of crude oil in each clump.

## OUR RED CEDAR IS A JUNIPER

NAMES WHICH come from the Bible have a way of turning up in common speech and in plant names. Because long ago the cedars of Lebanon got into the Bible, our common Missouri juniper is almost universally known as the Red Cedar rather than as some kind of juniper. Look through a list of common names for plants from almost any part of the world and you will probably find more than one which is known as this cedar or that cedar.

## CANE, *Arundinaria gigantea*

THE "canebrakes" in the South are formed by a grass which is really a bamboo and not in any way a sugar cane. It belongs to the genus *Arundinaria,* the only bamboo which is native to the United States. In the deep south it forms brakes higher than a man's head but in southern Missouri where it reaches its northern limit, one sees it forming isolated clumps and long straggly hedges along the edges of woodlands or forming dense stands along some river bottoms. Since its leaves are evergreen or practically so, it is most conspicuous in the wintertime. While not as graceful as the cultivated oriental bamboos, it has appealed to an occasional gardener and is sometimes cultivated in greater St. Louis.

## THE WINTER ASPECTS OF CANADA BLUEGRASS

IF ONE knows this grass at all, it is interesting to pay it a wintertime visit. The wiry dark green stems of summer are graceful but not particularly interesting; when they start into new growth down in the dry winter turf they are quite handsome. The species is called *Poa compressa* because the stems are slightly flattened. In the summer this is scarcely noticeable but on the new rhizomes they flatten out conspicuously and interestingly. The developing leaves take on a rich blue-green and there are streaks of contrasting grapejuice red on the young stems. They become most ornamental about February. E.A.

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The Missouri Botanical Garden is a fund member of the Greater St. Louis Fund for Arts and Education.

## SOME FACTS ABOUT SHAW'S GARDEN

The Missouri Botanical (Shaw's) Garden was established in 1859 by Henry Shaw, a St. Louis businessman, to be controlled by a Board of Trustees for the public benefit. The Garden is a non-profit institution which receives no support from the city or state, depending on the income from the Shaw estate supplemented by contributions from the public.

The old stone walls and cast-iron fences, the Linnaean House, the Museum Building, the part of the Administration Building which was Shaw's Town House, relocated in the Garden in 1890, and the Tower Grove House, his country home, all date from Mr. Shaw's time. The Main Gate and display and growing greenhouses are recent or before World War I. The Climatron, opened in 1960, is the world's first geodesic dome climate-controlled greenhouse and contains the Garden's main tropical collections.

### HOURS

The Garden—70 acres—is open every day of the year except Christmas and New Year's. For the Main Entrance, grounds, Climatron, display greenhouses and Floral Display House:

| | |
|---|---|
| May 1 through October 31 | 9:00 A. M. to 6:00 P. M. |
| November 1 through April 30 | 9:00 A. M. to 5:00 P. M. |
| (Sundays and Holidays | 9:00 A. M. to 7:00 P. M.) |

For Tower Grove House:

| | |
|---|---|
| May 1 through October 31 | 9:00 A. M. to 5:00 P. M. |
| November 1 through April 30 | 10:00 A. M. to 4:00 P. M. |

The Display House presents four seasonal displays: November, Chrysanthemums; December, Poinsettias; February, Orchids; Spring, Lilies and other flowers. During the year are other shows, competitions and festivals sponsored by various Garden Clubs and Flower Societies.

Courses in Botany and Horticulture for adults are conducted by the Garden staff. Children's nature classes are provided free on Saturdays from mid-September to early June. A special nature program is held during the summer. Information on these activities is published in the BULLETIN or may be had by mail or phone. The scientific activities of the Garden are integrated with those of Washington University.

In 1926 an Arboretum—1600 acres—was established at Gray Summit, Missouri. Foot trails and roads pass through the Arboretum and are open to visitors from April 1st to May 15th.

The Garden Administration Building is located at 2315 Tower Grove Avenue, and the Garden's main entrance is at Tower Grove and Flora Place. The Garden is served by both the Sarah (No. 42) and the Park-Southampton (No. 80) city bus lines.

Persons interested in helping to support the Garden and taking part in Garden activities are urged to do so through the "Friends of the Garden." Information may be obtained from the Main Gate or by mail or phone.

Phone TOwnsend 5-0440

# MISSOURI BOTANICAL GARDEN

# Bulletin

November 1966
Volume LIV
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THE GREAT BANYAN, CALCUTTA

COVER: When the BULLETIN published a short note on a very few of the world's outstanding botanical gardens two years ago, one of those we hated to omit was the famous old garden at Calcutta. The only information we could get at that time was that this Garden was plagued by governmental red tape; those who loved the institution were worried about its future. Since then, Mrs. Gandhi's personal visit has made us all aware of India's problems with her bureaucracies, the ways the problems arose and how they are being bravely faced.

We have also been in touch with Calcutta Garden's Director, the veteran Indian botanist, Dr. H. Santapau, who has graciously supplied us with up-to-date information about the lovely old Garden and some of its outstanding features.

Because of our special interest in banyan trees, now that a fine specimen is doing well in the Climatron, he has been kind enough to supply full particulars of their famous old tree with striking photographs from inside and outside its grove that make possible the next article in this BULLETIN and its accompanying illustrations (pp. 1–2). The beautiful photograph on the front cover makes me wonder if we might let our tree "jump" across the entrance path and provide a living Gothic arch just in back of the Climatron's turnstiles.

EDGAR ANDERSON

PHOTO COURTESY OF INDIAN BOTANIC GARDEN, CALCUTTA

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Missouri Botanical Garden Bulletin

Vol. LIV No. 9 November 1966

## ONE OF THE WORLD'S FINE BOTANICAL GARDENS

The Indian Botanic Garden at Calcutta with its world famous great Banyan Tree, is perhaps the oldest and largest botanic garden in Asia. Established in 1787, it has been a center of interest to botanists, horticulturists and gardeners for nearly two centuries. The garden has an area of 273 acres on the west bank of the Hooghly river. Its living collections include over 12,000 specimens comprising nearly 2000 kinds of trees, shrubs, and woody perennials. These are grouped geographically, the typical plants of one country being planted in a particular area. In addition there is a large collection of ornamentals, herbaceous plants, and other plants grown as winter annuals.

Among the interesting show-spots in the Garden are the large Palm-House, the Small Palm-House, the Orchid-House, the Fernery, the Cacti and Succulents, the giant Victorias from the Amazon and extensive special collections of Palms, Screw-pines, Bamboos and Conifers. There are long picturesque vistas, pleasant lakes, and miles of delightful walks.

The Garden is of high scientific interest as well as of great beauty; it serves as a source of inspiration, education, and research to its many visitors. It would be difficult to mention all the outstanding displays; a mere listing of things to see month by month fills a half dozen typewritten pages. (Somewhat condensed from an account prepared by the Director, Dr. H. Santapau, at our request.)

## THE GREAT BANYAN TREE OF THE INDIAN BOTANIC GARDEN CALCUTTA, INDIA

DR. H. SANTAPAU, DIRECTOR

The Great Banyan Tree draws more visitors to the Garden than its collection of exotic plants from five continents, the plant-houses or the special gardens. Botanically known as *Ficus benghalensis*, and belonging to the family Moraceae, this tree is a native of India. The fruit is like a small fig but is not edible, and is red when ripe.

This tree is over 200 years old; in spread it is the largest known in India, perhaps in Asia. There is no clear history of the tree regarding the time of planting, etc., but it is mentioned in the travel books of the Nineteenth

PHOTO COURTESY OF INDIAN BOTANIC GARDEN, CALCUTTA

Century. It was damaged by the two great cyclones of 1864 and 1867, when some of its main branches were broken, exposing it to the attack of a fungus. With its large number of aerial roots which grow from the branches and run vertically to the ground and look like so many trunks, the Great Banyan looks more like a forest than an individual tree. Another interesting point is that the tree now lives in perfect vigour without its main trunk, which decayed and had to be removed in 1925. The circumference of the original trunk at 5½ feet from the ground was 51 feet. The present crown of the tree has a circumference of 1,367 feet, and the highest branch rises to 88 feet. It has at present 1,044 aerial roots reaching down to the ground.

## THE GARDEN'S GIFT TO AMERICAN WINDOW SILLS

It was at the Missouri Botanical Garden that the common, everyday Philodendron with a heart-shaped leaf was transformed from a rare botanical curiosity to the adaptable little plant of window sills and florists' shops. So swift was its flight to other parts of the country that it got going before authorities on houseplants knew anything about it. In the East it was marketed as "St. Louis Ivy" and that is still its only published name in plain English. The whole phrase has even appeared in gardening books for the general public.

The scientific name has been less fortunate. In those few conservatories where the vine was being grown before its adaptability to apartment life was discovered, it was usually labelled *Philodendron cordatum*. A Philodendron it still is, but the "cordatum" part of the scientific name goes back before the time of Linnaeus, the father of our naming system. Deciding on the indisputably correct name under these circumstances can take much threshing out before all experts agree. *Philodendron oxycardium* has been advocated by some but *Philodendron* *scandens* has also been suggested. The authoritative Bailey's Manual continued to use the outlawed "cordatum" for years, apparently waiting for the dust to settle.

It was because of its mention as "St. Louis Ivy", however, that the whole matter was brought back to my attention again and led me down several interesting by-paths. Mrs. Hollis Suits, the daughter of a dear old friend, found the reference to "St. Louis Ivy" in a fascinating book and wrote to ask me about the connection. The book is so unusual and has charmed so many of the people I have shared it with, that I want to tell a little about *it*, before I get back to the Garden's role in the story.

THE PLANT IN MY WINDOW, An adventure of the human spirit,* was written by a city-news reporter (and concert reviewer) for the New York Times, Ross Parmenter, and he drew the accurate and effective line drawings of the Apollo paperback which Mrs. Suits so kindly sent me. It is written in a simple, flawless, running style and tells about the dried up little vine Parmenter found when he moved into one-room quarters on the 12th floor of a New York City apartment house. Parmenter describes himself as completely innocent of any botanical or horticultural understanding. Outwardly the book is a straight-forward account of his dawning interest in the philodendron and his adventures in learning more about it. Deftly worked into the simple tale, however, is a basic understanding of plant structure, a philosophical discussion of the effect of continuous city living on the human spirit, authentic glimpses of some New York Botanical Garden staff-members, a good bit about various botanical books, and several other matters.

Best of all for me, was a short paragraph about what happens when you observe effectively. I wish I might have had the following quotation from it to use during the decades I was trying to train students (children, undergraduates, graduate students, talented amateurs, the general public) to make significant observations.

"It is strange the way we look at things without seeing them. It is largely because vision, curiosity, and knowledge have a way of following each other around in a circle . . . When the wheel is started forward, no matter which of the three factors is considered first, the sequence is always the same; vision begets curiosity, curiosity gathers knowledge, knowledge sharpens vision, better vision develops further curiosity, and intensified curiosity digs harder for facts. And so on to the limits of the human mind with the totals steadily accumulating."

When Mrs. Suits' letter arrived I already knew the chief points about the Garden having called public attention to this versatile Philodendron, but I got in touch with Superintendent-emeritus George H. Pring, to fill in as many details as possible. The following account is chiefly from notes taken in September, 1965. "Philodendron cordatum" was brought to St. Louis for the 1904 World's Fair as part of a tropical exhibit. When the Fair was over it was given to the Garden and put into the East-Indian House where Mr. Pring says 'it grew all over the place'. When Mr. Pring saw how well the species did here, he called it to the attention of the Bourdet Nurseries which then operated directly across Tower Grove Avenue from the Director's residence on land leased from the Shaw estate. The Bourdet's were a French family who came to St. Louis in connection with the Fair and stayed on here to run a flourishing nursery for over two decades. They introduced this philodendron into the trade, and it spread rapidly over the country.

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*The Plant In My Window. Copyright 1949. Apollo Edition, 148 pp. 9 plates. 1962.

Loc. cit. p. 21.

However, as soon as it was grown from cuttings, it reverted to its small-leaved juvenile form as do many kinds of plants. Grown as a house plant it still remains in the juvenile condition, but if planted in a good tropical environment it finally will develop leaves up to a foot long. The species is native from Puerto Rico to Jamaica and sometimes persists on cliffs and rocky hillsides when the forest has been cleared. One who knew it only in the rain forest or only as a house-plant would never recognize the other form, the first time he saw it. In classifying Philodendrons much of the difficulty (and the expense) comes from bringing together in an herbarium the evidence from forest plants, greenhouse plants, and house plants effectively and accurately. Mr. Pring has a good story which illustrates this point:

"One of the times I was in Panama, I was entertained by the Director of the Panamanian Railroad (which as you know was operated by the U. S. government). His wife had just come back from a trip to New York and she said 'Oh, Mr. Pring, I want you to see this charming little plant that's the latest thing in New York. I think it will be nice down here in Panama'.

"I turned to her husband and said 'Your wife is going to kill me'.

"I just pointed to a big tree across the garden with a vine growing all the way up it and a whole strand of Philodendron hanging down 20 to 30 feet with a monkey swinging on it, and said 'That's it' and it was." (Hers was a juvenile cordatum so-called; the monkey was swinging on an adult "cordatum.") EDGAR ANDERSON

## THEOBROMA COMES TO THE CLIMATRON

ON AUGUST 12 the nation's chocolate manufacturers presented us with a thrifty specimen of the tree which is the source of chocolate and cocoa, *Theobroma cacao*. It is sometimes known as "cocoa tree" but is more widely called "*cacao*", (pronounced kah-cow, frequently with a long dramatic accent on the last syllable almost like an agonized "ough"). It is a wide-branching shrub or small tree which likes shade, plenty of water and moist, moving air. Consequently, it is seldom seen in most display greenhouses. The manufacturers, and those of us at the Garden, are hoping that like other tropical plants which demand something more than just heat, it will feel at home in the Climatron.

The morning of the 12th there was

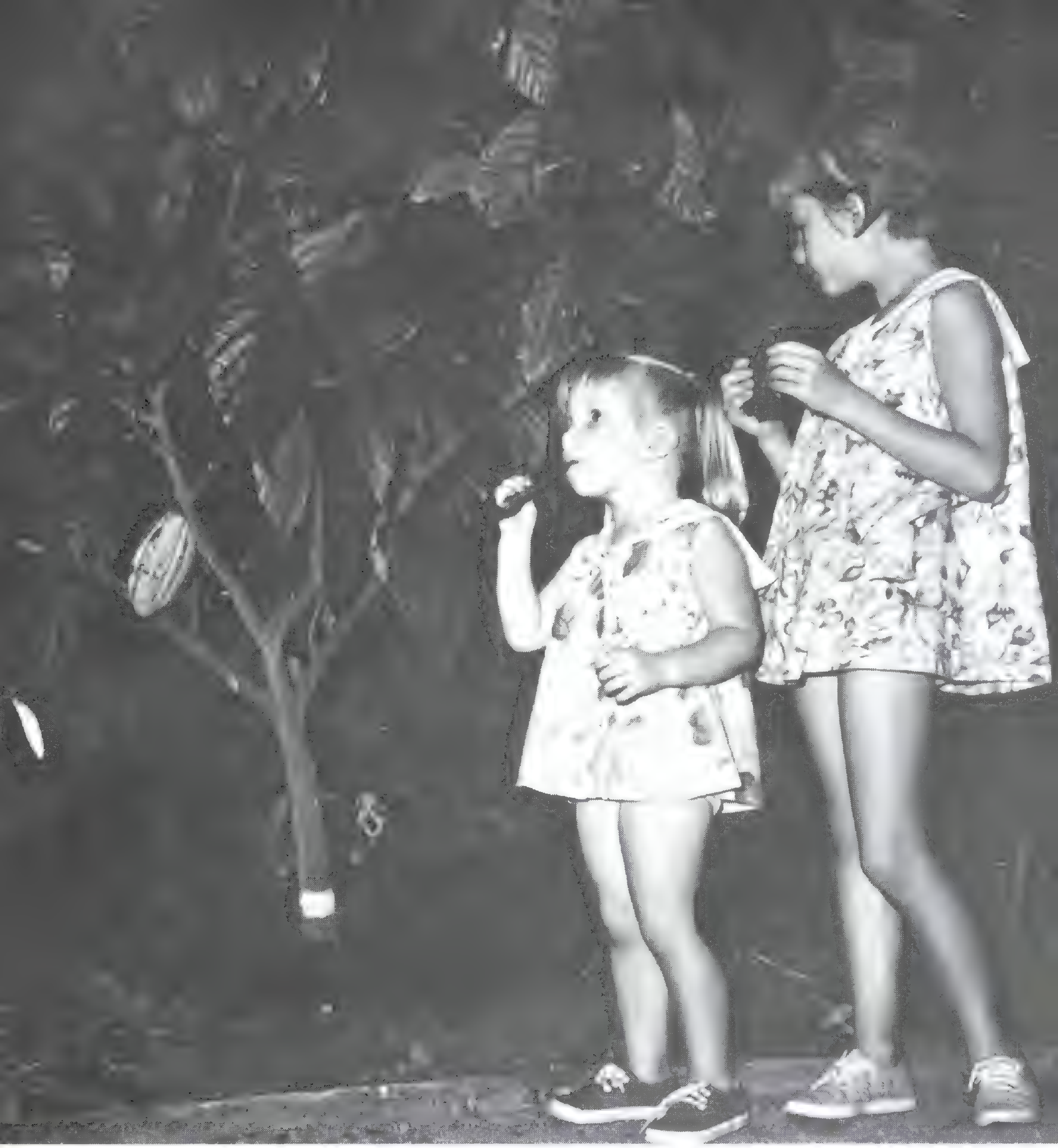

PHOTO COURTESY OF SHAW CAMERA SHOP

a special little ceremony. Dr. Gates accepted the theobroma on the part of the Garden, the last few shovelfuls of earth were placed around its base (symbolically, at least) and pictures were taken. The accompanying plate shows two little girls who were going through the Garden that morning and got pressed into service "to lend human interest" to the photograph. Though somewhat awed by all the goings-on, they are still enjoying the chocolate products which had been passed out to visitors as part of the celebration. However, they are just the right size and in just the right position to set off the theobroma and make this a good illustration of what a small cocoa tree looks like, just coming into bearing.

The growing bush branches out in all directions; the big leaves hang down. The small flowers (many of which are borne on branches so short that they seem to pop right out of the trunk) have been followed by large seed pods. These vary in color from one variety of cacao to another. They may be dull-brown or purple or yellow and can be variously flushed with rose pink or even with red. An occassional one is quite spectacular; the ripening pod on our tree was a discrete light cinnamon in color.

The following Sunday I strolled through the Climatron in the late afternoon and was surprised to meet one of our Latin American assistants hurrying up to the Theobroma with a small watering can. I gave him an inquiring look and in his halting English he told me, "In my country we have lots of *cacao*. It grows in wet. When you got one you give too much water; you *got* to give too much water! Every day! So I bring too much water Sunday afternoon".

As we stood there talking I was reminded of the time I saw small trees of *cacao* being grown in the upper edge of the hot country below Medellin, Colombia. There was a village of twenty or thirty thatched houses, each one set in about an acre of land. Their water supply was a stream which came down the mountain and at the upper end of the town was divided in branches so that a nice-sized brook wandered through each piece of property on its way down to the big river below. Many of the plants being grown were trees or shrubs, giving the whole village a Garden-of-Eden air which was heightened by the fact that the trees were dotted irregularly, frequently just one or two of each kind. They were mostly planted so close together that one could not see more than two or three homes at a time. It was curiously like a small Arboretum or Botanical Garden.

I was invited into one of these garden-orchards, one in which a *cacao* tree was bearing ripe fruit. My hostess graciously cut one open, and I tasted its frothy white pulp, flushed here and there with bright pink. It tasted sweetish and slightly perfumed. Imbedded in the pulp were the dark flat seeds which when roasted produce chocolate. They are about the size of the end of a man's thumb. In early times they were used for money, and I was interested to learn from our hostess that *her* few trees supplied the family with much of its week-to-week cash. Having been brought up to feel that hot chocolate was the most pleasing of all beverages, it was fitting to find it growing in such an idyllic setting.

Edgar Anderson

P. I. Lapin, at the left, Deputy Director of the Main Botanical Garden of the Soviet Academy of Sciences discusses a "delicious monster" with our Director. The flower they are so earnestly discussing is from a plant of *Monstera deliciosa.* It produces a popular (but inconveniently drippy) fruit with a flavor much like that of an over-ripe pineapple. Flowers of this type have the ability to generate heat, a property so unusual in plants that Dr. Gates was very skeptical about the matter when he first heard about it. He is now planning to study the phenomenon with modern precision equipment.

COURTESY OF POST-DISPATCH

## INTERNATIONAL UNDERSTANDING GOES FORWARD AT THE CLIMATRON

The Russians are looking into building a big Greenhouse in Moscow. On August 24th the Deputy Director of the Main Botanical Garden, P. I. Lapin, visited the Climatron, asking lots of questions and taking lots of pictures. They hope to have a structure, like the Climatron in having moving air of the proper temperature but better adapted to the severities of the Moscow climate: the severe cold, the long winter, the sun so low in the sky from November to February. He discussed their problems and when asked for suggestions about our difficulties with algae in the Climatron pool, he laughed and said, "Why don't you try windshield wipers?"

* * *

# NOVEMBER GARDEN TASKS

ELEANOR B. McCLURE

POETS have never been inspired to sing of the joys of gardening in November. However, despite the somber landscape at this season, there are certain garden tasks, important though prosaic, that can and should be done in late autumn.

First of all, most deciduous trees and shrubs can be moved or planted with minimum risk after they have shed their leaves and begun their winter dormancy. We do need to worry about excessive wilting or water loss, and they can be moved with relatively little shock.

Moreover, these fall transplants have a chance to settle down and get at least partly established during the long winter months. Since roots grow actively at a soil temperature of about fifty degrees, plants can develop new feeder roots during periods of mild winter weather.

A favorable soil temperature can usually be maintained by insulating the surface soil with a heavy mulch: partly rotted leaves, compost, manure, sawdust, or other organic matter, spread three to six inches deep. A light, airy mulch of dry oak leaves may be used in a very deep layer, whereas a material like sawdust that tends to pack should not be more than two or three inches deep. A good mulch should be well aerated, and it should permit ready penetration of water to the root area.

The long "recovery period" enjoyed by the fall transplant can be very helpful when trees and shrubs have to endure the capricious springtime weather that occurs so often in this area. Although we do sometimes have a cold, wet spring that is favorable to root development, there are often spells of really hot weather in late March or early April.

During unseasonably hot spells at that time of year, the spring-planted trees and shrubs may suffer because their root systems lack feeder roots and cannot supply enough moisture for the leaves — as a result, the tender new twigs and leaves lose water so fast that they may be burned almost to a crisp. Sometimes a plant can leaf out again, but it may be seriously weakened and not make a good recovery.

There is little wonder that tests at the University of Missouri proved that fall-planted fruit trees were about a year ahead of similar varieties planted the following spring. And furthermore, they continued to maintain superior growth.

Spring planting is sometimes recommended for some plants that are a bit "miffy" — dogwoods and *Magnolia soulangeana*, for example. The theory is that in spring, when the plant is poised to make an extra surge of growth, new roots and develop very quickly. However, we have planted quantities of dogwoods and magnolias in the fall, and most have grown well. During a very severe winter there may be some damage to branch tips, especially if the tree is planted in a very windy spot.

It is advisable, though, to see that the trees have good drainage, for they cannot tolerate "wet feet". In fact, we have found that dogwoods grow much better if planted shallow, with about one-third of the ball out of the ground.

First, dig a hole much larger and deeper than the ball. Dig out and discard the worst of the clay in the bottom of the hole, and break up the hardpan, loosening it as deep as possible with a spading fork. This gives the roots a chance to start the deep growth needed for good development. The drainage may also be improved.

Then add peat moss, perlite and compost to the topsoil. Fill the hole partly, tamping well, to settle the soil and bring it to the desired level, so that the top of the earth ball will be three or four inches above the surrounding soil. Fill and tamp the soil well around the ball. When the hole is nearly filled, water thoroughly, to settle the soil. Then add loose dirt on top, "saucering" the surface, to hold moisture.

The final step: Add a good organic mulch. We have found that dogwoods, magnolias, yews, and rhododendrons all grow better if planted "high", for these species are fussy about drainage.

Indeed, high planting also provides improved aeration in the root area, and this is also very important. Our soils are so tight and compact that roots may suffer for lack of air.

Recently I noticed a good example of the effect of good aeration on root development. This summer we balled a few rather large evergreen magnolias and then heeled them in on a big sawdust pile. After about six weeks we decided to plant the trees. We found that each one had developed husky, fibrous roots that had grown some eight or ten inches beyond the burlap of its ball. Abundant water, plus fine aeration in the sawdust, had provided ideal conditions for root development. We had aided, too, with occasional applications of Ra-Pid-Gro.

Winter protection should be provided for all new plantings: bulbs, perennials, evergreens, shrubs, and trees. As a matter of fact, it is advisable to check established plantings at this season, too. It is much easier to "winterize" the garden in early November, before the advent of the first really hard freeze.

In fact, mulching can be combined with the fall clean-up. Leaves, twigs, and dried grass raked from lawn areas can be piled around shrubs, evergreens, and small trees. This makes an airy mix that affords good insulation, but allows easy penetration of water. Sawdust, leaf compost, and rotted manure also make good winter mulches.

Dry oak leaves can be piled high around azaleas and rhodendrons. More care is needed when mulching perennials. Peonies and bulbs may be covered by the insulating layer, but it is not wise to bury an iris in a mulch or to cover the crowns of plants like columbines or delphiniums, for this could encourage fatal rots.

As a matter of fact, good winter drainage is essential for perennials, and it is likely that more fatalities are caused by soggy beds than by extreme cold. The soil should be sloped slightly, to carry the water away. One excellent horticulturist uses a coarse gravel mulch around the crowns of finicky perennials — a treatment that seems to provide good aeration and good drainage.

One of the best ways to protect roses is to pile dirt around the plants, making a mound six or eight inches high. This should not be done by raking up soil from between the plants and piling it around the canes, for this could cause injury to the roots. Instead, extra dirt should be brought in — and removed in the spring.

Some nurseries now sell light Fiberglas cones that can be anchored over individual plants. In the spring these cones can be removed and stacked for easy storage. Avoid the use of straw or similar protection that would tend to pack in a wet, soggy mass about the canes, encouraging stem cancer.

The easiest plan, of course, is to leave the plants unprotected. While a few plants may be lost in a severe winter, the replacement cost is usually no greater than the cost of adding winter protection.

Roses may be trimmed back slightly in the fall, but final pruning is best left until new growth starts in the spring. If the canes are extra long, they may be tied together loosely, to prevent damage from winter winds. And, of course, if the long canes seem too unsightly, they can be trimmed back to give the bed a neater look.

A final step in winter protection: Be sure that all plants have an abundance of moisture. It is best to water new planting each week until the ground actually freezes. Established trees, shrubs, and evergreens should have at least one thorough, deep irrigation, so that the soil is amply moist to a depth of a least twelve inches.

An abundance of soil moisture, plus a good mulch layer, will help prevent damage, since serious "winter burn" is really a dessication or drying out of plant tissues. For this reason it is advisable to keep the hose handy and to continue watering during mild spells in winter. In those "June in January" periods that sometimes occur we like to water even the leaves and needles of our evergreens.

With only a little watchful care before and during the winter months, we can give our plants a big assist and do much to avert really serious cold weather losses.

* * *

A glimpse of the Garden's staff picnic on October 1, as caught in a candid shot by Kenneth Peck, instructor. From left to right it shows one moment in the lives of Henry Hitchcock, the President of the Board of Trustees, Betty Pfeiffer from the Business Office, Frank Steinberg, Superintendent of our Gray Summit Arboretum with his dignified back towards the camera. At the far right, also facing away from us, is Jim Hampton, Chief Engineer and Superintendent of Operations, taking care of some detail with Bill Walker of his staff. Jim was practically our host since the Picnic was centered about the eqiupment sheds from which his department operates. With Jack Pavia he operated the barbeque pit most effectively, dealt with minor emergencies and made everybody feel at home. Many of the details were arranged by Dorothy Panos of the Herbarium office. She drew her whole family into the act. Among other things they supervised the afternoon games enthusiastically, delighting young and old. The weatherman cooperated with blue sky, cool, clean air, and warm sunshine. In addition to the barbeque and free drinks and ice cream, the ladies produced a vast display of home-made salads, casseroles, baked apples, cookies and prize-winning cakes. After everyone had been through the line once, the supply seemed scarcely touched (oh, to be sure, there were no more baked apples) but by the end of the afternoon there was little more left than a few cookie crumbs. E. A.

## COMING EVENTS AT SHAW'S GARDEN

November 1. Fourth Lecture, Evening Section. C. Barbre and K. Peck. 8:00–9:30 P.M. Experimental Greenhouse. Propagating from Cuttings.

November 3. Fourth Lecture, Afternoon Section. C. Barbre and K. Peck. 1:00–2:30 P.M. Experimental Greenhouse. Propagating from Cuttings.

November 4. Preview. Friends of the Garden Only. 5:30–7:30 P. M. Enter Main Gate or Service Gate on Alfred Avenue.

November 5. Children 7-16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. Make a simple bird feeder to take home.

November 4–6. Garden Gate Shop Special Sale. Floral Display Greenhouse. 5:00–7:00 — Friday, Saturday, Sunday.

November 5–27. Chrysanthemum Show. Floral Display House — Weekdays 9:00 A. M. to 5:00 P. M.; Sundays, 9:00 A. M. to 7:00 P. M.

November 8. Fifth Lecture, Evening Section. C. Barbre and K. Peck, 8:00–9:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

November 8. Winter Botany — E. Anderson — Museum Building — 7:30–9:30 P. M. $12.00 — 5 sessions. First session.

November 10. Fifth Lecture, Afternoon Section. C. Barbre and K. Peck, 1:00–2:30 P. M. Experimental Greenhouse. Propagating from Cuttings.

November 12. Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. Fun with Fruit. Learn to identify variety of fruits.

November 15. Winter Botany — E. Anderson. Museum Building — 7:30–9:30 P. M. Second session.

## NOVEMBER — DECEMBER, 1966

November 19. Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. Learn about the deserts of North America and how plants live in them.

November 22. Winter Botany. Third session. 7:30–9:30 P. M. Museum Building. Kenneth Peck.

November 26. Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. Winter Window Vegetable Gardens. Children will plant seeds.

November 29. Winter Botany — 4th session — 7:30–9:30 P. M. — E. Anderson and Kenneth Peck. Museum Building.

December 2. Preview. Poinsettia Show — Friends of the Garden Only. 5:30–7:30 P. M. Enter Main Gate or Service Entrance on Alfred Ave.

December 3. Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. Insectivorous Plants.

Dec. 3, 1966 – Jan. 8, 1967. Poinsettia Show. Floral Display House. Weekdays 9:30–5:00; Sundays 9:00 A. M. to 7:00 P. M.

December 6. Winter Botany. E. Anderson and Kenneth Peck — 7:30–9:30 P. M. Museum Building. 5th Session.

December 10. Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. Making Christmas Cards.

December 17. Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. Christmas Wreaths.

Dec. 23, 1966 – Jan. 1, 1967. Special Christmas Decorations — Tower Grove House — 10:00 A. M. — 4:00 P. M.

December 31. Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. Nature Movies.

December 31. Garden Closed from 5:00 P. M. until 9:00 A. M. Monday.

PHOTO—CLAUDE JOHNSON

## Two of the Garden's Alumni on a Recent Visit

Two prominent scientists trained at the Garden, visit with each other in the Research Office during the Annual Symposium on Systematics (the science of classifying all forms of life — plants, animals, and the primitive protista). The gentleman with his arms folded is Dr. M. T. Hall, the new Director of the Morton Arboretum in northern Illinois. He came here shortly after World War II already dedicated to straightening out the classification of red cedars. This was a problem of such complexity that it could not be dealt with satisfactorily by traditional methods. Before he could really start the main problem he had to develop an Index which could demonstrate the resemblances between one group of cedars and another. The first step was to study three very different old Red Cedar trees in a pasture at the Garden's Arboretum, so minutely that he could make a precise measure of the resemblances and differences of these three trees. It was fortunate that he really had his heart in the work. It took him nearly two years to work out this preliminary Index but he ended with a yardstick which he has adapted successfully in studying many species, hybrids, and races, of cedars.

Dr. Hall has been a teacher, investigator, and administrator at the Cranbrook Institute of Science, at Butler University, the University of Michigan, and Oklahoma University. He is discussing the strange object in the foreground, the large wooden structure in which are borne the nuts of a tropical Panamanian tree closely related to the one from which we get Brazil Nuts.

The other gentleman, Hugh Iltis, is one of three Garden Alumni who are connected with the University of Wisconsin. He has been studying plants virtually all his life. His father was a well known European Botanist who brought his Mendel Museum to this country to save it from destruction. At an early age Hugh Iltis developed an enthusiastic interest in all kinds of plants which still continues. He concluded the Symposium's formal program with a discussion of the basic scientific necessity of preserving and protecting key areas throughout the world. His presentation was so eloquent and so earnest that at the close his entire audience rose to their feet in thunderous applause.

Gatherings of this nature have been held at the Garden on an autumn weekend each year since 1954. The basic idea was to bring together informally all kinds of systematists and let them educate each other. The program is always divided equally between botanists and zoologists. Each symposium has been focussed on some particular problem, frequently one whose importance was just beginning to be recognized.

Dr. Iltis' lecture was most appropriate, for this year's program was centered about the increasing need of such "Natural Areas" as he was advocating for fundamental studies of classification. This year's symposium, like most of those in the past, was organized and directed by Dr. Hugh C. Cutler of the Garden's staff. These meetings, all but the first sponsored by the National Science Foundation, have been so successful that the number admitted each year has had to be held down to only a little over a hundred to encourage informal discussion and promote an effective meeting of minds.

Much care is taken to see that both young and old are included. This year, as in the past, our visitors ranged from young undergraduates to white-haired emeritus professors. Youngsters just beginning to take an interest in systematics sat next to scholars with worldwide reputations. There were teaching assistants, graduate students, instructors, professors young and old, staff members and directors of Museums, botanical librarians, a few brilliant investigators with exciting accounts of recent work which pointed up new kinds of problems whose answers will push back the moving frontier of science.

The general form of the program this year has been worked out over the last decade. Though formally it began with a Smoker on Friday Evening, a few students and professors arrived a day or so ahead of time to work in our Library and Herbarium. Students who arranged to do so were allowed to bring their sleeping bags and stretch out overnight on the hard floors of the Museum. One whole delegation arrived, somewhat unexpectedly, late Thursday night. A few of the young men slept so soundly that they had just barely risen and stowed things away when the first members of the Herb Society arrived bright and early Friday morning to set up their highly successful Fall Harvest Sale in the same rooms!

On Saturday morning those quartered in the neighborhood were served a simple breakfast in a Staff home. At noon there was an attractive hot lunch for all, in the head house of the new Park Building, the perfect spot for such a gathering on a cool gray day. That evening there was a banquet in Wohl Center followed by the Iltis lecture in Rebstock Hall Auditorium. Sunday there was a conducted tour to Tyson valley and our Arboretum at Gray Summit. Before and after and between the two formal sessions of the Symposium there were so many visits to the Climatron, to the Herb Garden and the Rose Gardens, to Mr. Shaw's country home, that the whole Garden looked like a busy college campus.

It was pleasant to have all the old-timers exclaim over the Garden's greatly improved appearance, to have nearly a dozen of our former students back for the occasion, to see many old friends, and to meet those whose papers one had read but had never seen face to face.

Best of all was the talk, profound to humorous, much of it mixtures of both. Questions, answers, debates. References jotted down in pocket notebooks; diagrams drawn on clean paper plates during a meal. One was seldom out of sight of an argument somewhere, a few of them the quiet co-operative fitting together of pieces of evidence. Many of them were vigorous, a few impassioned, none vindictive. Whole areas of thought got a thorough house-cleaning in many a head.

Edgar Anderson

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George B. Van Schaack, Librarian
Susan Verhoek, Herbarium Assistant

The Missouri Botanical Garden is a fund member of the Greater St. Louis Fund for Arts and Education.

# SOME FACTS ABOUT SHAW'S GARDEN

The Missouri Botanical (Shaw's) Garden was established in 1859 by Henry Shaw, a St. Louis businessman, to be controlled by a Board of Trustees for the public benefit. The Garden is a non-profit institution which receives no support from the city or state, depending on the income from the Shaw estate supplemented by contributions from the public.

The old stone walls and cast-iron fences, the Linnaean House, the Museum Building, the part of the Administration Building which was Shaw's Town House, relocated in the Garden in 1890, and the Tower Grove House, his country home, all date from Mr. Shaw's time. The Main Gate and display and growing greenhouses are recent or before World War I. The Climatron, opened in 1960, is the world's first geodesic dome climate-controlled greenhouse and contains the Garden's main tropical collections.

## HOURS

The Garden—70 acres—is open every day of the year except Christmas and New Year's. For the Main Entrance, grounds, Climatron, display greenhouses and Floral Display House:

| | |
|---|---|
| May 1 through October 31 | 9:00 A. M. to 6:00 P. M. |
| November 1 through April 30 | 9:00 A. M. to 5:00 P. M. |
| (Sundays and Holidays | 9:00 A. M. to 7:00 P. M.) |

For Tower Grove House:

| | |
|---|---|
| May 1 through October 31 | 9:00 A. M. to 5:00 P. M. |
| November 1 through April 30 | 10:00 A. M. to 4:00 P. M. |

The Display House presents four seasonal displays: November, Chrysanthemums; December, Poinsettias; February, Orchids; Spring, Lilies and other flowers. During the year are other shows, competitions and festivals sponsored by various Garden Clubs and Flower Societies.

Courses in Botany and Horticulture for adults are conducted by the Garden staff. Children's nature classes are provided free on Saturdays from mid-September to early June. A special nature program is held during the summer. Information on these activities is published in the BULLETIN or may be had by mail or phone. The scientific activities of the Garden are integrated with those of Washington University.

In 1926 an Arboretum—1600 acres—was established at Gray Summit, Missouri. Foot trails and roads pass through the Arboretum and are open to visitors from April 1st to May 15th.

The Garden Administration Building is located at 2315 Tower Grove Avenue, and the Garden's main entrance is at Tower Grove and Flora Place. The Garden is served by both the Sarah (No. 42) and the Park-Southampton (No. 80) city bus lines.

Persons interested in helping to support the Garden and taking part in Garden activities are urged to do so through the "Friends of the Garden." Information may be obtained from the Main Gate or by mail or phone.

Phone TOwnsend 5-0440

# MISSOURI BOTANICAL GARDEN

# *Bulletin*

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Volume LIV
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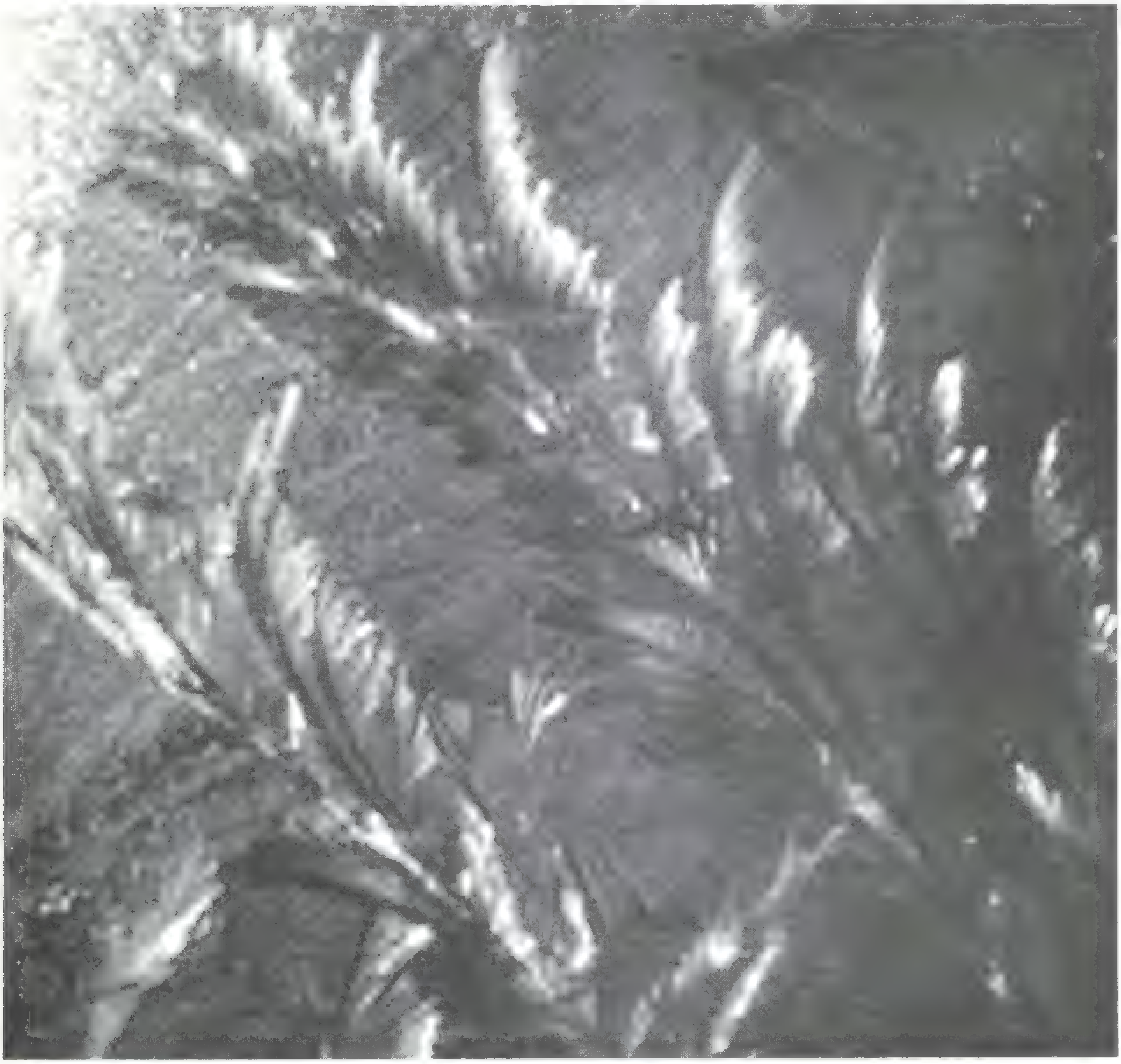

HOARFROST ON CHRISTMAS WINDOWS;

ROSES IN NOVEMBER GARDENS

COVER: Giant trees of ice crystals on the big vertical panes just below the curving dome of the Climatron.

PHOTO, COURTESY OF THE SHAW CAMERA SHOP

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Missouri Botanical Garden
Vol. LIV No. 10 Bulletin December 1966

# HOARFROST IN THE CLIMATRON AND SNOWFLAKES IN THE SKY

DAVID M. GATES

ONE of the finest shows in St. Louis, one of the rarest displays in the Climatron, occurs during very cold winter weather. When the outside temperature is below about 15 degrees Fahrenheit, great masses of hoarfrost form on the glass panes of the large perpendicular windows beneath

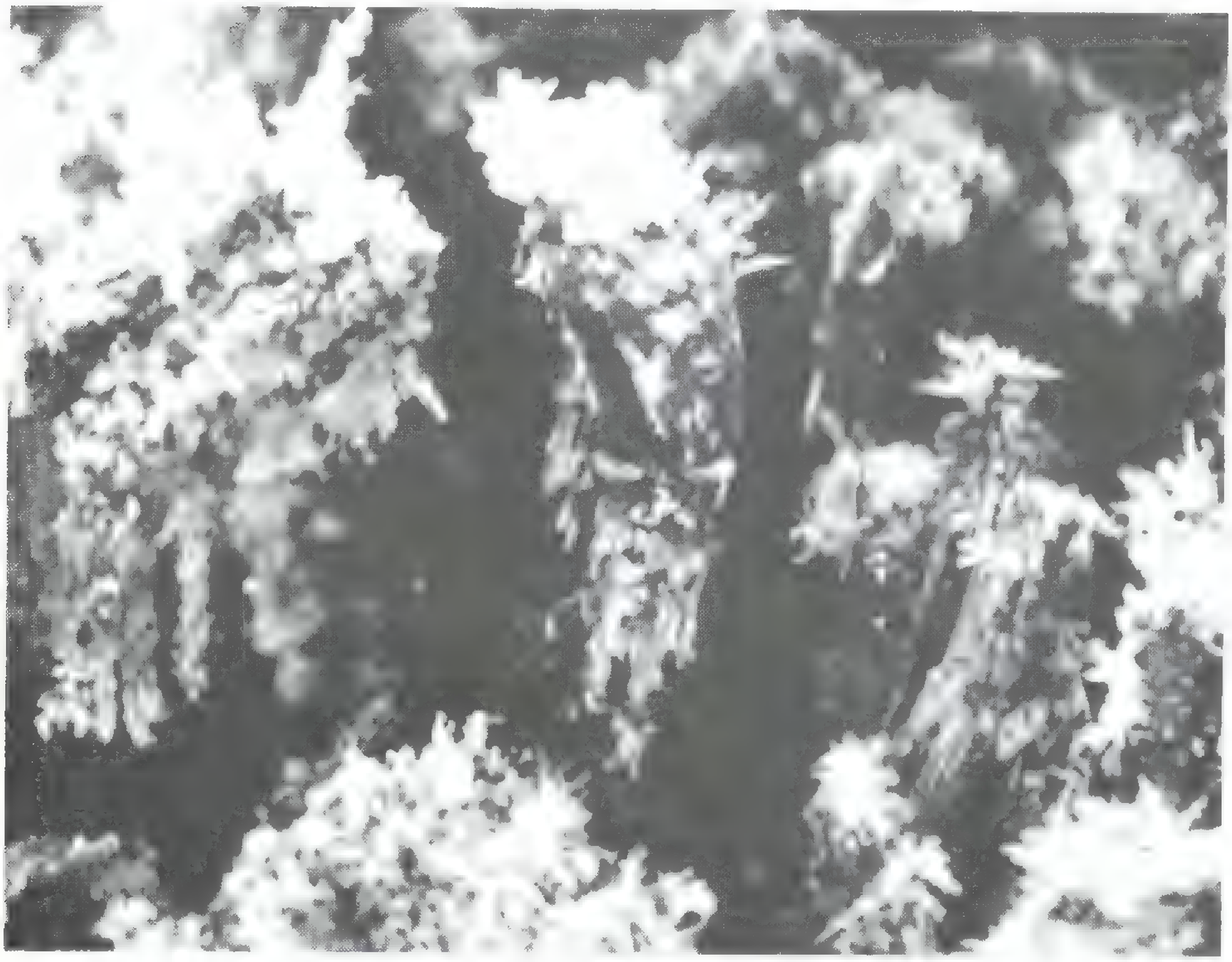
Columnar ice formed like a honeycomb from moist soil freezing in Yellowstone Park in January. The tube-like object is a thermometer.

PHOTOGRAPH COURTESY OF THE NATIONAL BUREAU OF STANDARDS the actual geodesic dome. As a result of the high humidity within the Climatron, (the air is nearly saturated) it is relatively easy for the glass to cool below the frost point. Then great fans or "trees" of ice crystals form, beginning their growth at the bottom and coldest portion of a window, and extending their main trunks upwards, branching and feathering out into magnificent crystal patterns. These great fans develop up to a height of eight feet or more.

Snow flakes and ice crystals are always a delight and a source of amazement. There was never a child who did not observe them in wonderment when first they fell upon his glove. Surely the ancient Greeks or Latins observed snowflakes carefully, but little is found in their writings. In China during the 10th century A. D., the Thai-Phing Yu Ran encyclopedia preserves a passage in a book of the Former Han dynasty written by Han Ying about 135 B. C. which says, "Flowers of plants and trees are generally five-pointed, but those of snow are always six-pointed" and then again in a poem by Hsiao Thung (A. D. 501–531) who edited the Wen Hsuan, the greatest anthology of ancient Chinese poetry, we have, "The ruddy clouds float in the four quarters of the cerulean sky, and the white snowflakes showforth their six-petalled flowers." The physician Chang Kao (A. D. 1189) wrote in his Medical Discourses: "The physician Li Wei-Hsi of Suchow was good at discussing natural phenomena. He said that the reason why double-kernelled peaches and apricots are harmful to people is that the flowers of these trees are properly speaking five-petalled, yet if they develop with six-fold symmetry, twinning will occur. Plants and trees all have the five-fold pattern; only the yellow berry and snowflake crystals are hexagonal. This is one of the principles of Yin and Yang. So if double kernelled peaches and apricots with an aberrant six-fold symmetry are harmful it is because these trees have lost their standard rule." The yellow-berry is *Gardenia jasminiodes* belonging to the *Rubiaceae.*

The first recorded scientific study of snowflakes was by the great astronomer Johann Kepler in his work *Strena, seu de Nive Sexangula,* published in 1611. Here he attempted to explain, on an atomistic basis, the formation of snowflakes as crystalline. In 1660 Erasmus Bartholinus first noted in writing, the branching of hexagonal stars. Five years later Robert Hooke made the first ice crystal observations with a microscope. Friedrich Martens went to the Arctic and made the first meteorological observations while at the same time noting the crystal form of the snowflakes. William Scoresby, who traveled in the Arctic before 1820, made the first systematic classification of snowflake form and laid the foundations for modern research.

Most people believe the freezing point of water to be at 32° F. However, this is only the freezing point of large amounts of contaminated water; that is of water containing impurities. The freezing of very small droplets of



More ice crystals pushed up out of the soil.
ANOTHER N.B.S. PHOTOGRAPH

pure water occurs at very much lower temperatures and may not occur until −40° F. If, however, there are impurities present, such as with droplets suspended in the atmosphere as clouds, then freezing may occur at 10° F or 0° F, or in any event at much warmer temperatures than for pure water. These impurities, which make it easier for water to freeze, are generally fine dust particles blown aloft by the wind. The most effective nuclei are particles of silicates or sands of various types and mineral clays such as kaolinite.

Ice crystals form three basic types: the hexagonal prismatic column, the thin hexagonal plate, and the branching star-shaped form called dendritic crystals. These three forms occur at distinct temperatures; when the air temperature changes, the crystal habit changes. In fact a skier can estimate the temperature of the air about him by noting the crystal form of the snowflakes falling on his jacket. The meteorologist can determine the temperature of a cloud by collecting snowflakes from it and observing their shape. The high cirrus clouds, which are usually colder than 24 degrees below zero Fahrenheit, are formed of long prismatic columns of ice. The medium altitude stratus clouds, at temperatures between 5 degrees above and 30 degrees below zero Fahrenheit contain both planes and prisms. Hexagonal plates, short prisms, long thin needles, and intricate stars form in low level clouds at temperatures between 32° F and 20° F. All of these forms have been reproduced in a cold box in the laboratory. If such a cold chamber is colder than 24° F at the bottom and near 32° F at the top all possible crystal forms will form along a thread running from the top to the bottom of the box containing saturated air. If the thread is raised or lowered the crystals will change their habit as they come into different temperature regimes.

Scientists have discovered how to encourage the formation of a snowstorm by seeding cold moist air with dry ice or with silver iodide crystals. This technique is one of the most effective means of weather modification. In January 1961 I was in Yellowstone National Park with Vincent Shaefer, the originator of the dry ice idea, on an expedition to study the properties of the clouds of moisture escaping from the geysers and hotsprings. Also with us was Dr. Bernard Monnegut, who originated the silver iodide technique of seeding. One evening I was in the valley of the Firehole River, about a mile below Old Faithful, working alone on an investigation of plants near a hot spring, when suddenly the crystal clear sky above me clouded over and I was enveloped in a snowstorm and showered with beautiful, delicate star-shaped flakes. Only later did I discover that Schaefer and Vonnegut had been running a kerosene fed generator, seeding with silver iodide smoke, the clouds of moisture emanating from Old Faithful. If I was surprised at the suddenness of the snowstorm, out of a clear cold night sky, I have often wondered what the pack of coyotes in the woods nearby must have thought. For around me that night were many of the coyotes of the Yellowstone, crying mournfully into the night air, disturbed by this stranger in their midst. On these very cold nights, with temperatures as low as 30° or 40° below zero Fahrenheit, the lodgepole pines would be coated with a magnificent frosting of ice crystals and the warm wet ground near the hot springs would freeze into great masses of columnar ice. To walk out into the cold still dawn, just after sunrise, was a sight to be seen and never to be forgotten. The entire valley of the Firehole River was quite literally a crystal palace lit with all the iridescence of a brilliant sun through an azure sky. Nearby were herds of bison and elk, and flocks of geese and ducks, grazing the rich grasses of that green valley which harbored abundant life during the long cold winter.

We all can not go to the Yellowstone in the winter, but we may enter the Climatron during the coldest days and see there its own remarkable display of hoarfrost and learn something new about the crystal world.

Alvaro Marmol and Mrs. Marion Pfeiffer of the Orchid Department with Joan Nolan, the "Miss Redbird of 1966-67," beside the Garden's Orchid Display at the Mid-America Orchid Congress and Show, October 21–23. See next page for further details.

PHOTO BY RALPH STOBH

THE MISSOURI Botanical Garden participated in the Mid-America Orchid Congress and Show at the St. Louis County National Bank in Clayton on October 21–23, 1966. An outstanding exhibit of flowering orchids was staged in a 100-sq. ft. area and evoked much comment from the visitors. Orchid growers from many parts of the United States could be seen congregating around the display, for the Garden has a reputation for possessing many botanical oddities besides the more flamboyant Cattleya species and hybrids. Joan Nolan, present "MISS REDBIRD," official hostess for the St. Louis Cardinals baseball team, was also drawn to the exhibit as it brought back memories of her high school days and the many visits with her class to Shaw's Garden. The 24-year-old "Miss Redbird" is employed by TWA as ground hostess at the St. Louis Municipal Airport. The Garden exhibit was staged by Mrs. Marion Pfeiffer, Alvaro Marmol and Lad Cutak. There is increasing interest among amateur growers in the easily grown but little known "showy botanicals" which made up the bulk of the Garden's exhibit, and it created much favorable comment and interesting discussion.

The dozen sorts most talked about are the following:

⁂

*Cattleya* 'Washington Centennial'

*Cattleya* 'Bow Bells'

*Cattleya bowringiana* 'coerulea'

*Cattleya labiata autumnalis*

*Cattleya* 'St. Louis'

*Dendrobium* 'Hawaiian Beauty'

*Dendrobium phalaenopsis*

*Encyclia prismatocarpum*

*Epidendrum ciliare*

*Laelia perrinii*

*Laeliocattleya* 'Dr. G. T. Moore'

*Laeliocattleya* 'Mimi Koehler'

*Oncidium incurvum*

*Oncidium papilio*

⁂

Harold Lloyd, Famous Comedian of Silent Movies Pays a Visit to the Garden.

FROM A KODACHROME BY LAD CUTAK

HAROLD LLOYD, famous comedian of the silent movies, was a visitor to the Garden in early October and he thoroughly enjoyed himself during his sojourn. Being an ardent camera enthusiast, he took pictures in the Climatron and then was escorted to the private houses where he shot several pictures of our spectacular orchids, as these flowers record well on film. Mr. Lloyd is also an enthusiastic gardener and at one time employed 20 gardeners on his estate. Now he has *only* ten. Querried about favorites in the plant kingdom, he likes them all—tropical plants of all kinds, orchids and even cacti!

Records show that Mr. Lloyd was born in 1893 but he certainly does not show his age. He started in movies in 1913 and continued up to about 1942. In his heyday he thrilled moviegoers of yesteryear, including this admirer of his, with his zany antics and escapades in such pictures as SAILOR-MADE MAN, GRANDMA'S BOY, DR. JACK, SAFETY LAST, WHY WORRY, GIRL SHY, and several others.

LADISLAUS CUTAK

# LEARNING FROM THE BEES: G. H. PRING AND WATER-LILY BREEDING

When George Pring started his career as a hybridizer of tropical waterlilies he had (in addition to his native wit) two special assets. (1) He had studied and worked with water-lilies in the Royal Botanic Garden at Kew. (2) He was working at an institution with a good botanical library. When he began a serious effort to breed new tropical water-lilies there was at hand here in the Garden Library, Henry S. Conard's monograph of the water-lilies of the world and Pring knew how to consult such a book. He knew how to find his way through the condensed technical information but he also realized that the best of such monographs is just a beginning. They summarize what little the world already knows about one group of plants; there is always much more which has to be found out if one is to get practical results.

When he tried his first crosses he made all the pollinations in the afternoon since that fitted best in his schedule. None of these crosses set seed, though he noticed that other flowers on the same plants, pollinated by insects, were making big seed pods. He set out to learn from the bees.

At intervals throughout the day for a few days, he laid other work aside and watched the insects in the big display pools. There were many of them, including honey-bees, a few moths, and even some wasps, but he soon found that most of the actual pollination of the big day-blooming tropical lilies was being carried on by tiny black bees about a third of an inch long. From flowers that had been open for two or three days they would fill the "pollen baskets" on their hairy legs with pollen for the young larvae to feed on; from blossoms that were open the first day they would try to drink the fragrant nectar and in the process of doing so, much pollen got carried from plant to plant.

Pring discovered that the whole story was complicated, but fascinating to watch. In the center of each flower is the organ which will develop into a seed pod. The day the flower opens it is like a little knob in the middle of the blossom, widest at the top, forming a shallow saucer which, that first morning, is filled with fragrant nectar. The little bees are attracted to it, most of them are already dusty with the yellow pollen from other blooms. They try to sip the nectar but frequently slip down into it and then struggle to get out. During this attempt they will first grasp the circles of stamens around the saucer, then a stamen in the next row and finally one of the taller ones in the third row. This bends with their weight and they are often catapulted back into the saucer of nectar. After repeated attempts of this sort the receptive areas of the stigmas have been pretty effectively pollinated. Some of the little bees never did get out and Pring found that mature flowers contained corpses of those which had perished. However, one point was certain: pollination was accomplished the first morning the flower was open, most of it between 10 o'clock and noon. Inconvenient or not, Pring adjusted his pollinating schedule to these hours and soon was as successful as the little bees he was imitating.

He worked in the big display pools with Mr. Joe Cutak (the father of our Ladislaus Cutak) as his assistant. In making the crosses they would select flowers from the pollen parent, two days before they opened. Using strong rubber bands he made three loops around each bud, one towards the tip, one about the middle and a final one which went down under the whole flower to the place where it joined the stalk, thus anchoring everything securely. This kept the pollen until he was ready to use it and (what is more important) this kept it from being contaminated with pollen from other kinds of water-lilies. The flowers chosen as seed parents were also prepared ahead of time and in them, all the stamens were carefully removed to prevent self-pollination. They were then pollinated artificially (on what would have been the second morning they were open) When the stigmas were most receptive to the pollen.

The first time he tried to pollinate one of these prepared blossoms, he found there was still more to learn. "Just as soon as I opened it up," he said recently, "a big wave of perfume came up from the flower, POOF! and hit me in the face. Then before I could pollinate, the odor attracted all those little bees and they flew in while I was taking off the rubber bands and getting ready to make the pollination." He finally solved his problem by having Joe Cutak wave his hands about vigorously above the flowers to keep the bees away.

Pring likes to tell about the reaction of some visitors while this work was going on. It must have been quite a sight. Both men were wearing rubber wading boots which came up to their hips, Mr. Cutak short and dark, in work clothes. Mr. Pring tall and blond, in just what he had been wearing in the office, sometimes even with collar and necktie (for this breeding program was carried forward on top of his fulltime duties as horticulturist and superintendent). Mr. Pring recalls with amusement some of the comments he overheard. "I can't figure it out at all," said one visitor, "the tall man is bending down doing something to the flowers and the little guy is all the time waving his hands back and forth over them like a crazy man. They must *both* be nuts."

Pring learned to wrap the developing seed head up in cheese cloth after the pollination had been made, tying the cloth tight by two ends. A label, (recording the percentage and the date) was fixed to a little bamboo stake securely anchored in the bottom mud of the pool. A long durable string connected each developing seed head with its label.

About three days after pollination the flower stalk would begin to bend in a big 'S' until the young seed head was drawn to the bottom of the pool. After three or four weeks, as it ripened, the gelatinous seeds became buoyant, the flower stalk rotted away and the seed head floated up to the surface, still held by the cheesecloth and string. When they came to the top they were among the most repulsive objects ever displayed in a botanical garden. A wet muddy ball of cheesecloth, a gelatinous mess of seeds, rotting stems and sepals. Who could have believed that from such a package would come some of the world's largest and most beautiful flowers?

These precious bundles were carried into the greenhouse and kept under the watchful eyes of Mr. Joe Cutak. Each was put in a battery jar of water, along with its label, and watched from day to day. In two or three days the black seeds fell to the bottom. Mr. Cutak kept his eye on them, for if they stayed there they would soon germinate and be difficult to transplant successfully. He would take them out and let them dry overnight. Then a little later they were sown in small pots in a mixture of two-thirds garden loam and one-third sand and the pots were set in the shallow nursery tanks in the greenhouse where tropical water plants are brought through the winter. The label (or a duplicate of it) went along with the seed, for in scientific plant-breeding the precise pedigree and the records that go with it are as important as in breeding race-horses.

These are a few of the key points in a program that produced most of the important break-throughs in the breeding of tropical water-lilies. Many of the varieties introduced by the Missouri Botanical Garden are grown and treasured all over the world, particularly in the tropics and sub-tropics. Those of us who work at the Garden are sometimes amused that St. Louisans, off on a cruise, are so suprised to find such well known MBG varieties as Mrs. Edwards Whitaker, General Pershing or Aviator Pring, on display in Jamaica or Hong Kong or Brazil. Not being Texans, it has never occurred to them that anything produced in their home city could really be *that* important!

It's the combination of all these things that made the program successful. It was the good training at Kew *and* learning about the water-lilies of the world from Dr. Conard's book *and* learning from the bees and from studying the actual plants themselves *and* Joe Cutak's faithful assistance in the pools and with the seedlings *and* Mr. Pring's persistence and ingenuity in getting hold of the rare species he needed. But this last item is another story, and a long one.

EDGAR ANDERSON

* * *

# A COLD FRAME FOR THE ROSE BED*

G. J. SAMUELSON

After years of providing winter protection to the individual bushes in my rose bed, I concluded that a better solution would be achieved by enclosing the whole bed within a removable cold frame. Accordingly, a year ago I built a shelter of polystyrene walls and transparent plastic top, the whole fitted together for easy assembly and disassembly. The roses have responded well.

Our winters are certainly not severe by more northerly standards, but they frequently are variable, with sharp drops in temperature following upon unseasonable mild spells, and vice versa. This condition is probably more damaging to non-native shrubbery than is more severe (but continuous) cold. However, we sometimes have bitter cold here, too. The net result is that our roses need winter protection—to prevent winter kill and to get them off to exuberent growth the following spring.

The usual method of protecting rose bushes is hilling up soil about their bases or covering them with leaves or straw. Recently, more sophisticated approaches to the problem have appeared: plastic or hardware-cloth enclosures for the protective soil or mulch, polystyrene cones to cover individual bushes. I have used the old standard methods with some success and a disappointing amount of failure. The latest device, the individual plastic cone, seems to be a fine technical solution. However, the cost is high if many bushes must be protected with cones of a size such that severe trimming is unnecessary; and it becomes a bit unwieldy to cover a multitude of normally-spaced bushes with individual cones.

Nevertheless, being a chemist with some appreciation of the insulating and low-density virtues of polystyrene compositions, for two years I had toyed with the idea of calling a halt to winter damage to my roses by enclosing them. Irresolution as to its being worthwhile, lack of time, and indolence had prevented any action. There were also the questions of cost and technical feasibility within the specifications I had in mind. I wanted the cover to be sturdy, light in weight, readily removable and storable, durable enough for many years of use, and not excessively expensive (excluding my own labor, which occasionally comes at a rather modest cost). So one day in late October 1965, I put my mental plans on paper, and began construction the following morning. Some three weeks later my roses were bedded down for the winter, just in time for the first severe cold snap.

I should hasten to explain that, while my family and I have long been rose lovers and growers, we have not planted them on a grand scale. Thus, in Texas, California, and Missouri, we have invariably had rose beds, with emphasis on quality rather than quantity. Usually these have been of the order of 100 to 200 square feet in size,

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*Based on an article in the *American Rose Magazine*.

containing some three to four dozen bushes, and of rather rectangular outline. My preference has been to limit the area and increase the bush concentration for ease of watering and spraying operations. Our rose garden has never been intended as a show-place; its purpose has been to provide us with blooms, indoors and out, on a satisfying but modest scale.

The present bed, established as a result of some family coercion, is not ideally situated but serves our requirements adequately if not extravagantly. It, too, was roughly rectangular in shape, sufficiently so that adaptation to true rectangularity — a requirement for ease of cold-frame enclosure — necessitated only minor modifications and few transplants. The bed was about 20 feet long and five to seven feet wide, large enough for about three dozen bushes.

My first step was to pour a concrete curb around the bed, this to provide a smooth surface upon which to stand the walls and to permit insertion of vertical lengths of standard three-eighths-inch pipe at regular intervals. The holes thus provided are for three-eighths-inch rods (of aluminum alloy) which slip into place to support the walls and top. The curb is three inches thick, a rectangle about 20 × 6 feet on the sides, with the upper surface essentially in a single plane, sloping slightly with the land. It was mixed and poured by hand, in three sections —good exercise for a sedentary rose grower. Its depth varies from about 10 to 16 inches. It is reinforced, moderately, with steel wire mesh.

The walls are of four-inch thick molded polystyrene, which is rather rigid and comes in various thicknesses and lengths. I used 4 × 8-feet sheets. A two- or three-inch thickness would have been adequate for insulation, but I wanted the greater structural strength of the thicker walls. The long sheets were sawed lengthwise and on a slight angle to provide a north wall 24 inches high, a south wall 16 inches high (these are 20 feet long), and end pieces to match. Thus, the roof lies flat against the upper surface of the angle-cut walls, with a slight slope toward the south to shed rain and admit as much as possible of the light of the low winter sun. The eight wall pieces are butted together at corners and section ends, being fitted so that only minor cracks are open to wintry blasts. These could be sealed with tape, though I consider this unnecessary. The only lateral support for the walls consists of the three-eighth-inch aluminum rods extending, through vertical holes punched through the polystyrene, into the holes provided in the concrete curb. These are at two-foot intervals. The rods are long enough to extend about an inch above the walls, where they fit into holes in the framework of the roof.

The latter consist of ten frames of 1 × 3-inch redwood, each about 2 × 6 feet in size and covered with plastic. I constructed the frames to lie rather snugly on top of the walls, and hinged them in pairs so that alternate ones may be opened readily (folding flat on those adjacent) for ventilating and servicing the bushes. Indeed, the whole roof can be installed or removed in 15 minutes, should the vagaries of weath-

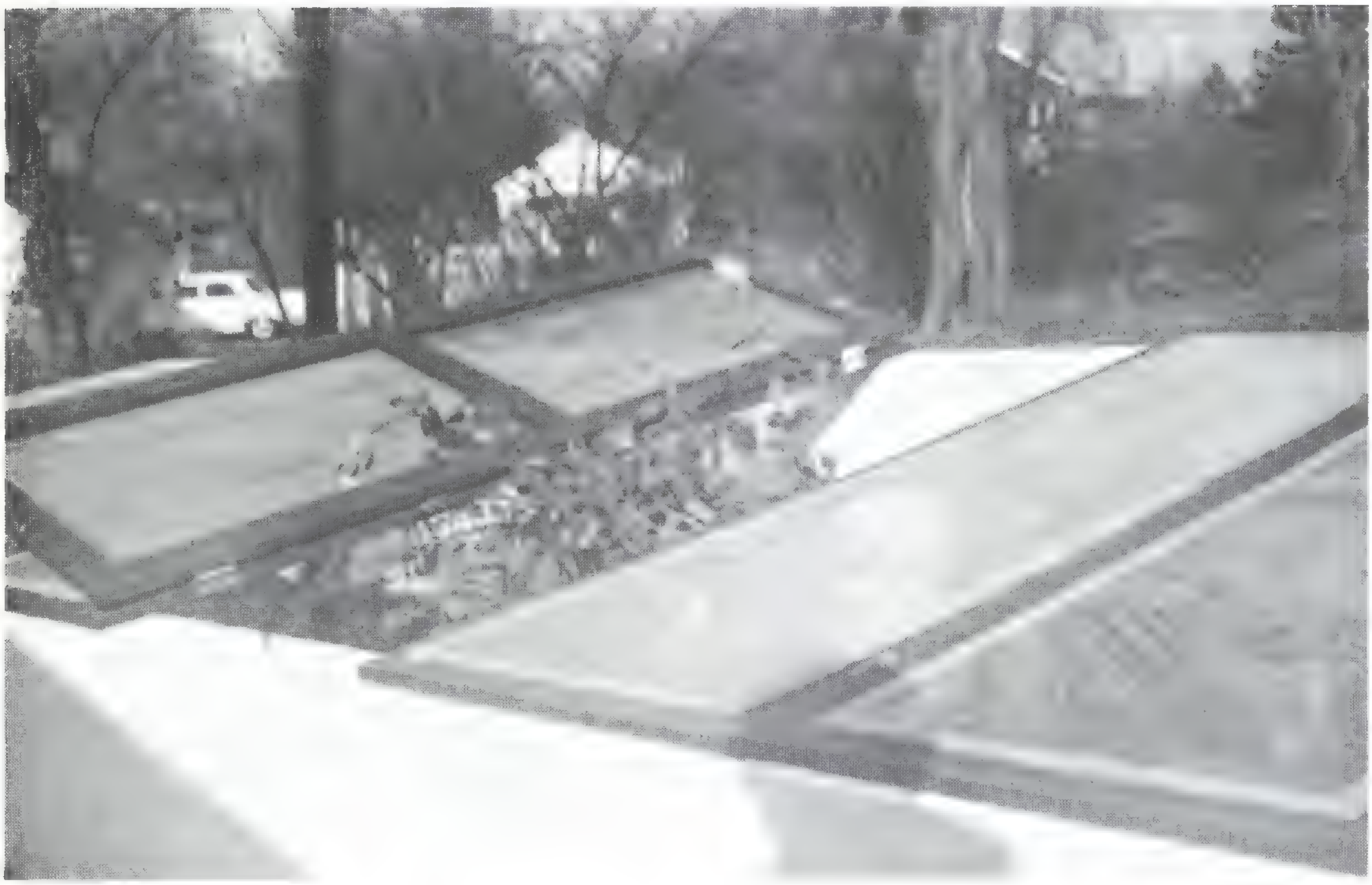

PHOTO G. J. SAMULLSON

The completed cold frame in operation.

er so require. The transparent top is of Mylar sheet (5-mil thickness*). Mylar is an excellent cover, durable and clear. I have used it for years to cover a small cold frame and a lily pond, the latter inhabited throughout the year by a few goldfish. The plastic sheet is fastened to the frames, each of which has a center cross-piece, with nailing strips and aluminum nails. The frame pieces are flush-fitted together, and secured with screws and waterproof cement. They are painted with redwood finish.

The completed structure (see photograph) seems gratifyingly sturdy, able to withstand wind, rain, snow, and hail. The latter may be the worst enemy of the Mylar, although it seems to be nearly as good as ordinary glass in withstanding hail. Whether the structure has the desired longevity remains to be tested; after one winter's use it is undamaged. Certainly, during that period, it achieved excellent protection to the rose bushes.

Some of the advantages are obvious. The bushes bloom later into the winter. They need not be cut back at all severely either in the fall or spring. Sixteen- to twenty-four-inch canes can be accommodated without difficulty under the roof, and much longer ones can be bent to the enclosure. (I did this early last November with several tall, bud-bearing canes and was able to harvest a few choice blooms late in December). More importantly, because temperature changes within the enclosure are gradual, there is almost no permanent winter damage, with the result that bushes resume vigorous growth very early in the spring, blooming earlier and more abundantly. Added to these advantages is the fact that it is much simpler to place and remove this protective cover than to place and remove hills of soil about each plant.

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*A mil is 1/1000 of an inch.

I have checked temperature differentials in the depth of winter. On a morning during a protracted cold period when the outside reading was −8° Fahrenheit, the inside reading, a foot above the soil level, was +10°. During winter days, provided the sun shines, the inside temperature rises sharply. On a sunny day in February when it was 45° outside, the inside temperature reached 80°. Usually, on such days, I open about half of the sash to limit unseasonable growth and prevent possible later damage.

The bushes remained green and growing throughout the winter and were full of incipient new growth as early as late February. For this reason I sprayed them to limit the possibility of disease, and foliar fed them at the same time. On April 24, when I removed the cold frame structure for the summer, growth was abundant and many flower buds (a few showing color) were present. These developed rapidly into full blooms in early May; I harvested the first of them on May 7. After that date an abundance of flowers was available constantly. I have never achieved such rose growth and bloom in this area, even during normal seasons; to be rewarded with so many lovely blossoms throughout May was ample recompense for the labor and expense of constructing the shelter.

From observation of other rose gardens in this vicinity, I believe that these protected bushes, at the time they were uncovered, were two to three weeks advanced over those traditionally cared for. Furthermore, none was lost or even slightly damaged. Though last spring and summer was a bad season for mildew because of continued cool damp weather, it was no worse on these than on other bushes in the neighborhood. The plants were vigorous and responded well during the severe heat of last summer.

Now let us consider cost. The 24 individual cones were to cost about $37, delivered. The cold frame, which perhaps more effectively protects about three dozen plants, cost me about $116—for material; the labor cost would be prohibitive, were it hired, though I found the work refreshing. The largest single cost was for the molded polystyrene, or "bead board," ($53.06). Other costs were: Mylar film, $12.47; lumber (for concrete forms and for roof frames), $28.25 (redwood is expensive, but durable and easy to work); and cement, sand, and gravel, $4.98. That item of greatest labor but least cost, the concrete curb, is really an unnecessary embellishment—the rod-supported walls might well be erected on reasonably smooth soil. In my case, the location dictated curbing. Replacements for winter-killed rose bushes of patented varieties cost about $3 each, plus a lot of exasperation and labor; so perhaps my investment was not excessive. At the least, it provides a good deal of interest and enjoyment.

I realize, of course, that such a cover is impracticable for a large or irregularly-shaped bed. But, short of an actual greenhouse, it provides good winter care for prized roses.

## GOETHE AND *GINKGO BILOBA*

GOETHE, in addition to his many other accomplishments, was a leading botanist of his time. His *Metamorphosis of Plants* is still a landmark in the history of botany and he coined the word "morphology" generally used for the scientific study of form in plants, animals, or even landscapes.

Goethe's study of the transformations of leaves led him to take a special interest in the fascinatingly variable leaves of the ginkgo. In one of his later (and lesser known) works was a poem entitled "Ginkgo biloba." A ginkgo in the park of Heidelberg Castle was named for him and for many years has borne a sign calling attention to his interest in that particular tree.

The ginkgo gets its specific name, "biloba," from a curious notch down the middle of the leaf. On leaves of seedlings or sprouts this notch may cut the leaf almost in half and the lobes themselves may be still further divided. The much smaller leaves on the flowering branches of a mature tree show the opposite extreme. In them it is a mere nick in the margin at the midpoint. Yet when the leaves of the tree as a whole are considered, it is clear that they are all variants of one basic pattern, a leaf divided by a median notch.

This was the basic problem which occupied Goethe's mind when he studied the ginkgo as a younger man. When he wrote his poem about it he had been brooding over a related philosophical problem: does this division down the middle indicate that we are dealing with one object or two half objects? He got out of this impasse by declaring that both aspects were present in the ginkgo.

The poem marks one of the later romantic episodes in Goethe's life. According to tradition he had gone for a walk with a lady in whom he was interested and their mutual understanding had reached new heights. Returning home in the glow of this experience he composed his poem about the ginkgo, delicately alluding to this deepening relationship, separate yet united, just as in the ginkgo leaf, and dedicated the poem to her.

### GINKGO BILOBA*

Leaf of this tree, set to greening
In my garden from the East,
Savors of a hidden meaning,
To the knowing one at least.

By itself in twain divided
Does it have the life of one?
Is it two who have decided
As a unit to be known?

Answering these, with little trouble
On the very sense I hit;
For I am that one and double;
In my songs thou feelest it.

---

*Translation by John Weiss (1818–1879).

EDGAR ANDERSON

THE CAMELLIA Display in the Linnaean House was beginning to be attractive well before Thanksgiving. All through January it should have the color and charm of an old Southern garden.

## COMING EVENTS AT SHAW'S GARDEN: DECEMBER–JANUARY

| | |
|---|---|
| December 2. | Preview. Poinsettia Show—Friends of the Garden Only. 5:30–7:30 P. M. Enter Main Gate or Service Entrance on Alfred Ave. |
| December 3. | Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. Insectivorous Plants. |
| Dec. 3, 1966–<br>Jan. 8. 1967. | Poinsettia Show. Floral Display House. Weekdays 9:00–5:00. Sundays 9:00 A. M. to 7:00 P. M. |
| December 10. | Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. Make Christmas Cards. |
| December 17. | Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. Make Christmas Wreaths. |
| Dec. 22, 1966–<br>Dec 31, 1966. | Special Christmas Decorations—Tower Grove House—10:00 A. M. –4:00 P. M. |
| December 25. | Christmas Day, Garden closed. |
| December 31. | Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. Nature Movies. |
| January 1. | New Year's Day, Garden closed. |
| January 7. | Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. "Winter Puzzles." Children will identify trees in winter by their twigs. |
| January 14. | Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. "Jungle Plants." A short trip through the Climatron to see the habits of some jungle plants. |
| January 15–29. | Primrose and Cyclamen Show. Floral Display House. Weekdays 9:00–5:00. Sundays 9:00 A. M. to 7:00 P. M. |
| January 21. | Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. A short discussion of plant cells; microscopes will be used. |
| January 28. | Children 7–16 years. Free. Kenneth Peck. 10:00 A. M. Museum Building. "Table Top Greenhouses." Propagate plants from cuttings. (Bring a 1 lb. coffee can and plastic bag large enough to cover.) |

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The Missouri Botanical Garden is an agency of the Arts and Education Fund of Greater St. Louis.

# SOME FACTS ABOUT SHAW'S GARDEN

The Missouri Botanical (Shaw's) Garden was established in 1859 by Henry Shaw, a St. Louis businessman, to be controlled by a Board of Trustees for the public benefit. The Garden is a non-profit institution which receives no support from the city or state, depending on the income from the Shaw estate supplemented by contributions received from the public and an annual allocation from the Arts and Education Fund.

The old stone walls and cast-iron fences, the Linnaean House, the Museum Building, the part of the Administration Building which was Shaw's Town House, relocated in the Garden in 1890, and the Tower Grove House, his country home, all date from Mr. Shaw's time. The Main Gate and display and growing greenhouses are recent or before World War I. The Climatron, opened in 1960, is the world's first geodesic dome climate-controlled greenhouse and contains the Garden's main tropical collections.

## Hours

The Garden—70 acres—is open every day of the year except Christmas and New Year's. For the Main Entrance, grounds, Climatron, display greenhouses and Floral Display House:

| | |
|---|---|
| May 1 through October 31 | 9:00 A. M. to 6:00 P. M. |
| November 1 through April 30 | 9:00 A. M. to 5:00 P. M. |
| (Sundays and Holidays | 9:00 A. M. to 7:00 P. M.) |

For Tower Grove House:

| | |
|---|---|
| May 1 through October 31 | 9:00 A. M. to 5:00 P. M. |
| November 1 through April 30 | 10:00 A. M. to 4:00 P. M. |

The Display House presents four seasonal displays: November, Chrysanthemums; December, Poinsettias; February, Orchids; Spring, Lilies and other flowers. During the year are other shows, competitions and festivals sponsored by various Garden Clubs and Flower Societies.

Courses in Botany and Horticulture for adults are conducted by the Garden staff. Children's nature classes are provided free on Saturdays from mid-September to early June. A special nature program is held during the summer. Information on these activities is published in the BULLETIN or may be had by mail or phone. The scientific activities of the Garden are integrated with those of Washington University.

In 1926 an Arboretum—1600 acres—was established at Gray Summit, Missouri. Foot trails and roads pass through the Arboretum and are open to visitors from April 1st to May 15th.

The Garden Administration Building is located at 2315 Tower Grove Avenue, and the Garden's main entrance is at Tower Grove and Flora Place. The Garden is served by both the Sarah (No. 42) and the Southampton (No. 80) city bus lines.

Persons interested in helping to support the Garden and taking part in Garden activities are urged to do so through the "Friends of the Garden." Information may be obtained from the Main Gate or by mail or phone.

Phone TOwnsend 5-0440

# BROMELIADS

LADISLAUS CUTAK

Missouri Botanical Garden Bulletin

Volume LV No. 1 January 1967

THIS entire issue is the work of LADISLAUS CUTAK. He not only wrote the text but designed and executed the covers and took all the photographs. It is based on decades of experience with these beautiful and unusual plants; and of sharing it with amateurs and professionals alike.

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# Missouri Botanical Garden Bulletin

Vol. LV No. 1 January 1967

## BROMELIADS

### HOUSE PLANTS PAR-EXCELLENCE

LADISLAUS CUTAK

For those who wish to grow *different* kinds of house plants from the usual sorts, I recommend trying the bromeliads or bromels—terms denoting members of the pineapple family. These are not exactly new plant-novelties, strictly speaking, for they were in esteem in Continental Europe in the early part of the nineteenth century, or better still, in the heyday of the "stove plant" era—1826 to 1890. It is here, in the United States, that bromeliads failed to excite the home gardener, even though these plants are native Americans. The reason for this lack of interest can no doubt be laid to the woeful lack of literature on the subject and the fact that the average American nurseryman is not disposed to stock up plants which may not have immediate sales appeal.

In the past few years, however, bromeliads have stirred up quite a bit of interest, for these exotic plants have much to recommend them. In the first place they possess year-round good looks, produce handsome blooms and are easy to grow. There are hundreds of them, varied and colorful, but of course, not all of them suitable for the house.

Bromeliads always fascinated certain individuals in various parts of our country but there never were enough of them in one locality to establish personal contact for the mutual exchange of plants and knowledge. One had to hie himself to botanical institutions in order to view, compare notes, and talk with the experts who knew anything about them. Our institution, the Missouri Botanical Garden, always kept a representative collection of bromeliads on display. In the past two decades a

*Aechmea aureo rosea*

*Vriesea* × 'Mariae' (See p. 3.)

marvelous resurgence in house plants has caused many plant groups to come to the forefront and bromels were one of them. The great interest led to the formation of the Bromeliad Society in late 1950 which now has members in all parts of the world. (The Society publishes a very fine *Bulletin*, issued six times a year—subscription $5.00 per year). This organization has for its ultimate object bringing the great wealth of knowledge and experience which was stored up in the first period of the bromeliad popularity in Europe and consolidating it with modern techniques as practiced in America today. In the early days nearly all the work on bromeliads was done by the Europeans but now most of the plant hunting and taxonomic research belongs to the Americans. The foremost monographer of the family today is Dr. Lyman B. Smith of the Smithsonian Institution, whose enormous productions of new species descriptions have enriched bromeliad literature extensively. In the field of collecting, Mulford B. Foster, Orlando, Florida, has become the greatest discoverer of bromeliads in modern times, with over 100 new species and varieties credited to him. It is also due to his untiring efforts that the bromels have become such a favorite house plant.

What makes a *bromel* such an unusual subject? It is the uncommon form and growing habit coupled with colorful inflorescences which makes it so outstanding. Then, too, culture is relatively easy.

Bromels are, for the most part, tropical plants although a few of them can withstand a certain amount of cold weather—even freezing, if not of prolonged duration. They are strictly American plants, although one species has been discovered in French West Africa in 1937. The plants are either terrestrial or epiphytic. Some grow in the ground like the well known pineapple and prefer a xerophytic condition, which means they can take sun, wind and drought for long periods. Even better examples are the Dyckias, Hechtias, Encholiriums and Puyas which often grow in association with cacti and therefore demand equal cultural treatment. On the other hand, there are other terrestrials like the Pitcairnias and Cryptanthus, which prefer shade and moisture. The epiphytic bromels find abodes in the crotches and fissured bark of tropic trees where only filtered sunlight reaches them. Some species hug rock faces of steep canyon walls. At no time can bromels be considered parasites as they derive all their nourishment from the air. They rely on their host merely for support, clinging to it with a tenacious grip. One species, *Tillandsia recurvata,* has invaded telephone wires in civilized lands just to be different.

A typical bromeliad plant is composed of several to many leaves arranged in a whorl or rosette. It can be gigantic or very diminutive with leaves grasslike or widely strapshaped, short or long, rigid or flexible and with or without marginal spines. The leaves can be extremely showy especially if mottled, marbled, striped or spotted in various shades of green, yellow, pink and purple. The flowerstalk may be terminal or lateral, in various degrees of thickness and size, and as diverse as the leaves. The inflorescence sometimes is hidden in the nest of leaves or extends beyond the rosette, sometimes erect and other times definitely pendent. Individual flowers may be minute and inconspicuous or large and showy, with or without fragrance. The seedpod or fruit is often richly colored and remains on the stalk for several weeks, depending upon the genus.

At the present time there are around 1,600 species and varieties of bromels recognized, but some of them are extremely rare in cultivation and others not known anywhere except in their natural habitat. In recent years, hybridization has increased the number of horticultural forms, some of the most outstanding being the following:

*Aechmea* × "Bert"
× "Burgundy"
× "Foster's Favorite"
× "Foster's Favorite Favorite"
× "Maginali"
× "Royal Wine"
*Billbergia* × "Catherine Wilson"
× "Fantasia"
× "Muriel Waterman"
"Windii"
*Cryptanthus* × "It"
*Dyckia* × "Lad Cutak"
*Neoregelia* × "Thelma Hodge"
*Tillandsia* × "Emilie"
*Vriesea* × "Mariae"

*Tillandsia lindeni* (See p. 20)

It appears that among this great number one would be able to choose suitable species for the home, office or store. In addition to their hardy constitutions, many of the bromels have all the captivating qualities that make desirable indoor plants: decorative leaf patterns, stunning flowers, beautiful berry-like fruits—all of which will lend themselves fittingly to all kinds of artistic arrangements. Some of the Aechmeas and Billbergias produce a vase-like appearance and actually hold plenty of water in their centers. A resourceful lady of the house can place cut flowers in these living vases. The flowers will keep fresh for a period of days.

There are few houseplants that will give so much and ask so little in return. Among them the bromeliads are almost foolproof plants. It is true, some species are extremely touchy outside of a greenhouse but quite a few can withstand abuse as much as the cacti and succulents in stuffy apartment houses. One advantage bromels have over other house plants is that they always remain such tidy, compact little plants in a pot. They never grow so tall as to need a support or spread haphazardly in all directions necessitating tying up to keep them in place. If you leave on a short vacation they need no one to look after them and will not suffer from negligence. However, the grower ought to get acquainted with the kinds that will be suitable for various parts of the house.

*Billbergia macrolepis*

If there is a glassed porch or sunroom one can assemble a neat collection of bromels for a hobby or grow them with other ornamental subjects such as begonias, ferns, aroids and other exotics of kindred nature. The amount of space will determine the number that can be grown. An ordinary sunny window will not hold too many plants but it is possible to build an extended glass compartment from it in order to insure additional space for more plants. This compartment can be erected at slight cost and need not be elaborate. It can be permanent or just a temporary affair, resting on the windowsill and its sides screwed to the window frame, covered with glass or any of the plastic materials developed for such purposes in this modern age. It is heated from the living room or kitchen as the window is always open. A well-lit basement is likewise a good place to grow plants especially if there is room under the windows for a sort of pithouse compartment. Window sash serving as the roof will admit plenty of light and give identical conditions as are prevalent in a greenhouse. Glassed-in breezeways in ranch-style homes are also excellent places for growing bromels.

Because of their pleasing and often colorful forms, bromeliads may be placed in various parts of a room to add accent to a particular spot even though that spot is a darkened corner or a niche in the wall. Some species will retain their brilliant coloring for a long time even in the dark but it is advisable and more appropriate to return the plants to a more favorable environment between intervals in order to insure proper development.

Bromeliads do well in a soil mixture of half leafmold and half sand—a mixture which drains very freely—certainly among the easiest of ingredients for gardeners to find. However, if you make a serious study of these plants common sense will advocate a slight deviation from the general potting medium when dealing with the true xerophytes and the true epiphytes. The desert kinds love a much heavier soil composed of ordinary garden loam and sand to which decayed leafmold and some pulverized or dry manure can be added. Some of the tree dwellers, like most of the Vrieseas and Guzmanias, prefer straight osmundine fiber, the same which is used for potting orchids. For others I have been using, with excellent results, decomposed leafmold and sand mixture to which is added old discarded orchid fiber, pulverized cow manure, and horticultural peat. Frequent transplanting is not recommended, unless the soil mixture becomes too loose with careless potting or with quick-deteriorating material. Often a single potting is sufficient to carry a bromel plant through to maturity.

In their native habitats air plants, like the epiphytic bromels, are well supplied with moisture the year round. This is because the gutter-like leaves which form the rosette growth direct the rain or moisture to a natural reservoir in the center. Into this tank small twigs, leaves and other debris fall from above and when thoroughly decomposed furnish food for the plant which absorbs it through its leaves. That is why when growing any of the cup-forming bromels in the home it is imperative to keep the leafy cups filled with water at all times. Other epiphytic bromels, mostly Tillandsias, which do not possess the water reservoirs are able to live through the dry seasons because they are furnished with microscopic peltate scales which capture moisture from mists and fogs which regularly shroud the countrysides. A daily syringing of these narrow-leaved plants is advocated especially during the summer season when rapid evaporation takes place. That is why the Spanish Moss and the Ball Moss, and other dwarf Tillandsias can live on during the seasonal rainless period.

The dry-soil kinds will get along with less attention. Like cactus, they should be watered very sparingly. It is a known fact that most bromels do not like "wet feet," and if planted in too large a pot, root deterioration and

*Aechmea fosteriana* (see p. 10)

*Neoregelia ampullacea* (See p. 17)

subsequent leaf discoloration results.

Although bromeliads will thrive for years on plain water, they will appreciate food occasionally, especially very weak liquid manure (diluted to the color of weak tea). If it is possible to catch rainwater do this by all means because rainwater is very beneficial. It is also advisable to put the bromels outdoors during a rainstorm when the weather is ideal. You will soon note by the healthy color of the leaves that bromels enjoy a good old-fashioned rainshower. Too often our tap water is highly alkaline and bromels resent its use. Tell-tale marks of lime deposit on the surface of the basal leaves will be noticeable when water is impregnated with alkali salts.

During the summer months most of the epiphytic bromels, easily identified by the soft-textured foliage, demand considerable shade. If grown in a greenhouse and the full sun hits them, the plants will easily burn or assume a limp, flabby appearance. Only the heavy-textured species of Dyckia, Puya, Encholirium and Hechtia revel in full sun. Neoregelias, Aechmeas, Billbergias and Quesnelias like plenty of light for their best development but not the direct rays. It is well to inspect your bromeliads every day along with your other house plants and by noting their conditions you will soon learn which need light or not.

As to temperatures, bromeliads are not too fussy because many of them endure extremely high degrees in their tropical homes while others grow where freezing weather may occur. However to strike a happy medium, temperatures best suited to bromeliad culture should range in winter between 50 degrees F. and 70° F. Our homes usually are kept at these levels but it might be worthwhile to mention that the cooler plants are kept in winter, the less water will be needed.

Bromeliads are seldom troubled by pests, yet occasionally scale insects and mealybugs may become a serious problem. There is a minute, black, hard-shelled scale that may become troublesome if allowed to spread. As soon as it appears, scrape off the scale with a toothpick or fingernail and brush the spots with a miscible oil solution. If a heavy infestation is permitted then this method would prove rather awkward and laborious. Spraying with miscible oil is considered dangerous since the spray will reach the central leaf reservoir, then flow over the leaves to the roots, but strange to say, I rely on Greenhouse Volck to combat this pest and it has worked successfully for me. As a precaution you might tip the plants on their sides to dump out all water and oil film and after a few hours syringe the treated plants with clear water. Some commercial growers recommend Parathion but this insecticide is dangerous to use, as a mask must be worn and no parts of the skin left uncovered. A safer product, Malathion, is now being used which is less toxic to persons. Mealybugs are less frequently to be found on bromels but occasionally do occur, especially at the tips and along the margins of leaves or on the more tender growth of seedings. Frequently they can be controlled simply by running the infested leaf between the fingers and wiping it off. In the case of the spiny Dyckias an oil spray is recommended or just syringing under pressure with water.

The propagation of bromeliads can be carried out in two ways: seeds and cuttings. Most of the bromels produce plenty of seeds. For best results they should be planted as soon as possible. For the amateur there may be some disappointments in store if he attempts to grow the Tillandsias, Vrieseas and Guzmanias but no trouble should be experienced with Dyckias, Billbergias and Aechmeas. The latter retain their viability for several months and the seeds are easier to handle. Billbergia seeds, as well as those of other genera, when ripe are stuck together within the pod by a gelatinous substance which must be washed off to prevent growth of fungi. The desert species may be sown like cactus seed in a soil mixture of well rotted leafmold, sand and garden loam. Firm the soil gently and barely cover the evenly distributed seeds with sand or fine gravel. Do not water from above but place the seed pan in a shallow dish of water until moisture shows on top. Place a piece of glass over the top of the pan to prevent change of temperature and rapid drying of the surface. Do not allow seedpans to dry out or become too soggy. When the seedlings are large enough to handle conveniently, transplant them into community pans, then into single pots.

Seeds of Tillandsias, Guzmanias and Vrieseas are very small, plumose and attached to silken threads which help them to float in the air and eventually settle on humus or mossy trunks and branches of trees to germinate. Fern tree slabs or blocks are best to use since the surface is firm and it retains moisture while draining away an excess. The slabs must be soaked in water to wet them through and vigorously shaken to remove the drip. Then the seeds are deposited on the surface and the slabs placed in a wardian case or large glass container where humid conditions are maintained. Shade the seedlings and do not pemit drying off at any time.

Seeds are not as yet readily obtainable from dealers except the desert kinds, so the best and quickest method to propagate bromels will be by offsets. Most of the bromeliads produce a number of offsets at the base of the mother plant. These can be removed when about 2 or 3 inches high, being pulled off or cut close to the old base, and then rooted in equal parts of sand, shredded sphagnum or German peat. The old plant then will continue to make new suckers. Sometimes as high as a dozen suckers may be pulled off a vigorous plant before it dies. If suckers are not cut off but allowed to mature then only one or two are produced. In some instances only one sucker per plant is possible after flowering even though it is taken off. Such a plant is *Vriesea splendens.* No amount of coaxing will induce more than one growth from each plant. Plants of the genus Cryptanthus, frequently used in dish gardens, produce several growths from the old flower spike. These will voluntarily drop off, at which time they are easily rooted in sand. In fact they need not even have roots as I have seen them multiply and mature on a gravel bench where moisture is prevalent.

Bromeliads are neat and attractive at all times, and many of them bloom in winter when other plants are dormant. In fact, you can find some kind of bromel to bloom every month of the year.

How is one to go about selecting a few bromeliads for the window garden from the 1,600 known species? First, you had better limit your choice to those that are offered in the trade. Julius Roehrs Company in Rutherford, New Jersey, offers a wide selection (but this firm is strictly wholesale) in *Exotica,* one of the most prodigious books on plant life ever published. The book will give you a good idea of the kind of bromels you might want. California Jungle Gardens in Los Angeles, Oakhurst Gardens in Arcadia, California, Alberts & Merkel Bros., in Boynton Beach, Florida, are about top nurseries in this field although many other plant dealers who specialize in exotic foliage plants include bromeliads in their stock. Mulford Foster in Orlando, Florida, is sole distributor of many new species and hybrids which he first collected and later hybridized. Bromels vary in price, depending upon size and rarity, from about 50¢ to $10.00 a plant. Probably the 50 most decorative bromeliads on the market today are the following, which includes species and varieties only. There is a plethora of bromel hybrids which are even more spectacular, some of these already mentioned in earlier pages.

- *Ananas ananasoides*
- *Aechmea calyculata*
  - *caudata variegata*
  - *chantinii*
  - *fasciata*
  - *fulgens discolor*
  - *miniata discolor*
  - *nudicaulis*
  - *orlandiana*
  - *racinae*
  - *victoriana*
  - *weilbachii*
- *Billbergia brasiliensis*
  - *euphemiae*
  - *leptopoda*
  - *litzei*
  - *pyramidalis*
  - *saundersii*
  - *vittata*
  - *zebrina*
- *Cryptanthus bivittatus*

*Aechmea miniata discolor* (See p. 10)

*fosterianus*
*lacerdae*
*Dyckia fosteriana*
*rariflora*
*Guzmania ligulata*
*monostachya*
*musaica zebrina*
*zahnii*
*Neoregelia carolinae tricolor*
*ampullacea*
*marmorata*
*spectabilis*
*Nidularium innocentii lineatum*
*Quesnelia liboniana*
*marmorata*
*Orthophytum navioides*
*Pitcairnia andreana*
*Tillandsia cyanea*
*bulbosa*
*ionantha*
*lindeni*
*streptophylla*
*Vriesea ensiformis*
*fosteriana*
*heliconioides*
*hieroglyphica*
*imperialis*
*splendens*

All of the above are noted for their outstandingly beautiful foliage and for the brilliancy of bloom and the fact that some of them have been in the trade for such a long time. In order to learn a little more about the above and also others that are equally as attractive, I will briefly describe each in alphabetical sequence.

*Acanthostachys strobilacea.* Even though it is a rather straggly plant with several spreading and slender, few-leaved stems, it makes a suitable subject for a hanging basket. At most it is a botanical oddity and gives the appearance of one of the terete-stemmed cacti, such as Rhipsalis. Small pineapple-like inflorescences appear from near the ends of the leaves and are very colorful with their carrot-red bracts and yellow flowers.

*Aechmea distichantha* (See p. 10)

*Aechmea angustifolia.* This medium-sized plant with fairly stiff, spiny, purple-spotted green leaves is quite attractive in fruit, the white berries turning a vivid blue.

*Aechmea bracteata.* A robust grower from Mexico and Honduras. When grown in a pot the erect, rigid, bright green leaves form a tight cylindrical, vase-like container up to 2 feet high, but if planted out in a greenhouse bed the plant will form hugh clumps with spreading leaves 5 feet or more in length. Tiny greenish-yellow flowers appear on a branched flowerstalk with bright red scape-bracts which remain colorful for at least 8 weeks.

*Aechmea bromeliifolia.* Is a very decorative medium-sized plant which bears a densely white-wooly, pinecone-shaped flowerspike with straw yellow flowers arranged in spiral rows. The flowers turn black shortly after and conspicuously mark the spike. A dye was made from the yellow fluid extracted from the crushed stems and used by the West Indian natives.

*Aechmea calyculata.* An epiphytic medium-sized plant with stiff green tubular foliage and a thistle-type head of yellow flowers which remains in color for a long time.

*Aechmea chantinii.* A medium-sized plant with stiff green leaves boldly banded with silvery white. Flowers are yellow and white. This is a variable plant in its growth habit and several forms have earned the names of 'Red Goddess' and 'Pink Goddess.' This is now one of the most sought after species and an extremely beautiful plant whether in bloom or not.

*Aechmea distichantha.* A robust grower from Brazil with a tall vase-like growth when grown in an earthen pot. The gray vase produces a tall deep pink flowerspike with peculiar deep pink claw-like branchlets upon which purple flowers rest.

*Aechmea fasciata.* Undoubtedly the most popular and best known bromeliad and a must in anybody's collection. The upright, rather stiff green leaves, beautifully banded with silver are an exquisite living vase from which a strong long-lasting cluster of delicate pink bracts and blue flowers shoots up in summer. By all means include this number in your collection because even when not in bloom it is a gorgeous thing.

*Aechmea fosteriana.* Another tubular-formed plant with leaves of pale green mottled with purple-brown zigzag markings and edged with green spines. The flowerspike sports rich yellow flowers subtended by crimson bracts.

*Aechmea fulgens* var. *discolor.* An old-fashioned favorite from French Guiana, long known to plant fanciers, with silvery green foliage complemented by purple undersides and a flowerspike which remains brilliant for 2 to 3 months. Get this for your collection.

*Aechmea mariae reginae.* A large imposing plant found in Costa Rica, really not suitable as a pot plant unless it can be grown in a large container. Would make an excellent patio subject as it likes light. The erect, handsome flowerspike is topped by a cylindrical 'corncob' head of violet flowers and bracts of a watermelon-pink color.

*Aechmea miniata* var. *discolor.* A very decorative plant to be sought for a shaded position. The glossy bronze-green foliage is a lovely maroon on the underside and further accentuated by an unusual flower head which produces flesh to bright cherry red berries that last a long time.

*Aechmea nudicaulis* var. *cuspidata.* A strikingly banded stiff plant suitable for a sunny window. Its yellow flowers and red bracts single it out as an outstanding subject. The variety is a much heavier plant than the true species and has broader leaves which show slight horizontal silver markings.

*Aechmea orlandiana.* A bizarre beauty valued for its striking chocolate to black zigzag mottlings on the bright green leaves. The center leaves grow erect and form an urn but the lower leaves have a tendency to curve abruptly down over the flowerpot. An orange flowerspike with white flowers barely extends above the tips of the center leaves. Loves light but will grow in shade also. It is an introduction from Brazil, first collected in 1939.

*Aechmea racinae.* This should be grown as a basket plant because unlike most Aechmeas it produces a most startling pendent inflorescence which hangs far below the plant with individual flowers that put one in mind of the "corn candy" sold in confectionery stores. The flowers have a brilliant red ovary, bright yellow petals with a black splotch at the base. Leaves form an upright rosette and are a bright shiny green. Don't overlook this one as it blooms around Christmas.

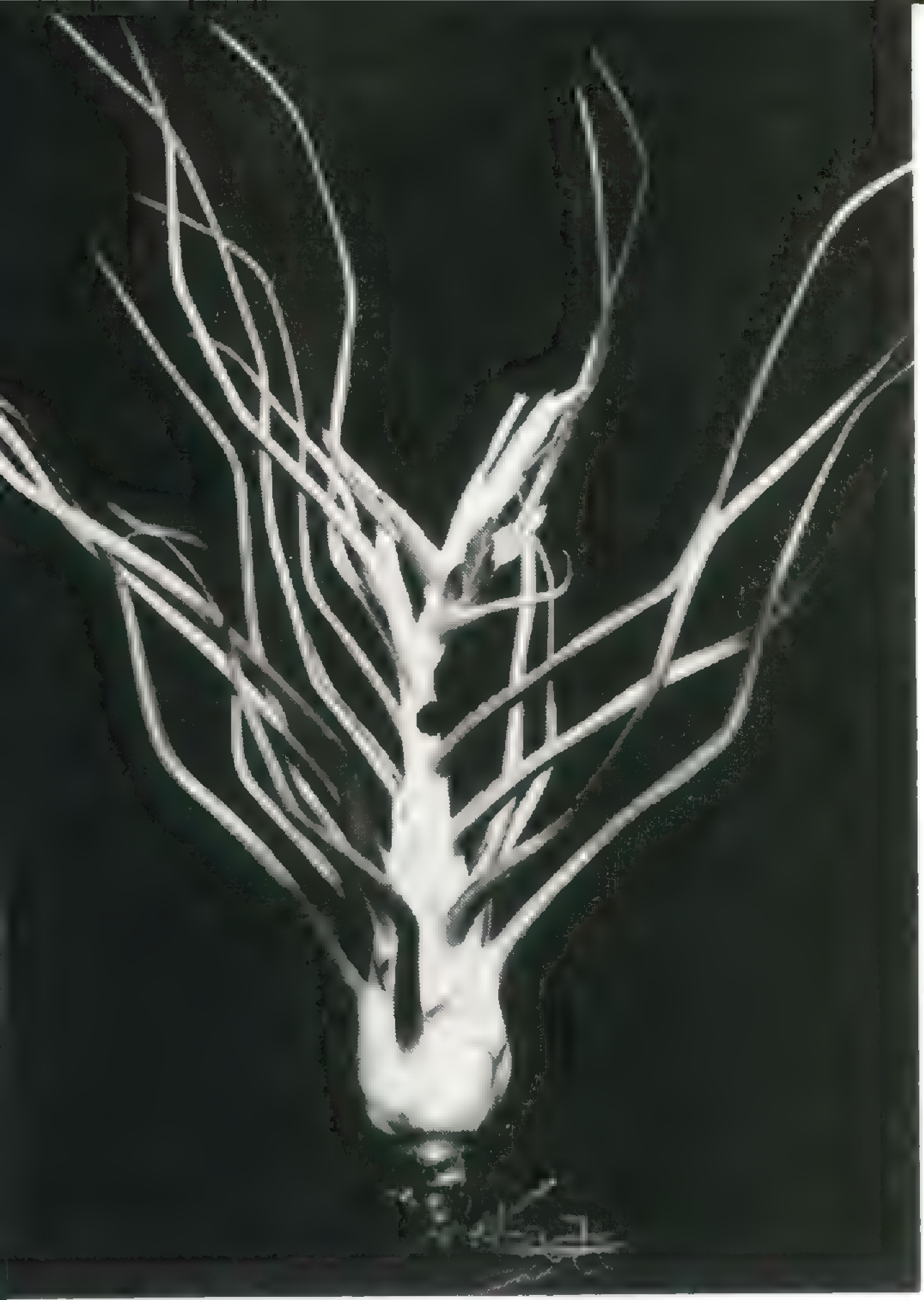
*Aechmea victoriana.* This one comes in two phases, the red and the green. The leaves of the red form are richly tinged underneath with reddish purple while the plain form has bright green leaves. The flowerstalk emerges from the center but begins to arch above where it produces a reddish peach-colored berry-like cluster of raisin purple flowers.

*Aechmea weilbachii.* A very good grower and easy propagator. It possesses rather thin-textured, reddish-tinged leaves in a loose spreading rosette. A bright red floral stalk supports lilac-colored blossoms and the berries that follow remain attractive for several months.

*Ananas comosus.* This is the well known pineapple and always makes an interesting house plant. The crowns from the pineapple that you buy can be cut off, calloused and planted in sand. Here is your first chance at bromeliad growing. The crowns also make an excellent focal point in flower arrangements. There is a very decorative dwarf pineapple with fruit only 1 to 2 inches long which should be a curiosity in any collection. It is known botanically as *Ananas ananassoides* var. *nana*, but I warn you it is not edible.

*Billbergia amoena.* This is one of the most variable species in the genus but a good grower and also of easy culture. The soft-textured leaves form a broad rosette from the center of which, pink-bracted flowerstalks emerge producing long tubular green-

*Aechmea pineliana*



*Tillandsia bulbosa* (See p. 19)

ish flowers flushed a blue violet at the petal tips.

*Billbergia euphemiae.* This is a tubular plant marked by cross bands of gray from which hang pleasing pendent flowers. It is a stoloniferous plant and therefore makes an attractive basket plant. Like most Billbergia flowers, these too, are richly colored but last only a week or two.

*Billbergia horrida* var. *tigrina.* This variety should be grown in full light so that the rich red brown leaves can be accentuated by the silver crossbands. It is a highly decorative plant the year round with rather stiff leaves that exhibit a peculiar gutting in the basal sheaths. The flimsy flowerhead is composed of fragrant greenish white flowers.

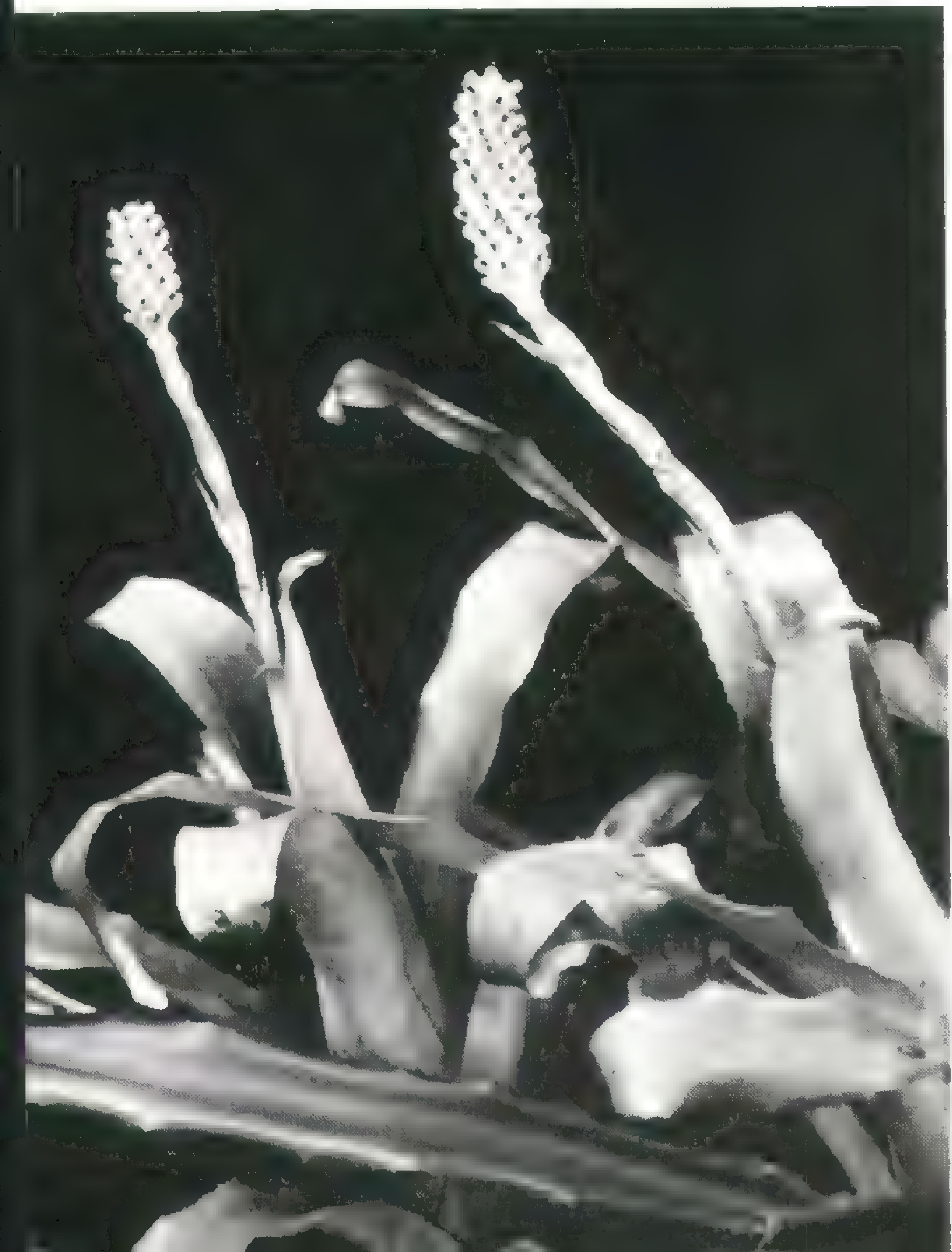
*Billbergia leptopoda.* Advertised as the "Permanent Wave Plant" because its grey-green spotted leaves are fantastically curled. It suckers freely and also wants lots of light to bring out the spots. The colorful inflorescence further adds to the beauty of this gem.

*Billbergia lietzei.* An excellent pot plant with curled, light-green leaves which are dotted with yellow and the flowers a bright cerise red.

*Billbergia macrocalyx.* Produces many stiff gray-green tubes marked by silver bands. The densely white-mealy spike bears pale greenish flowers tipped a heaven blue.

*Billbergia nutans.* Probably the commonest Billbergia that is blessed with a hardy constitution. It can be grown in the ground, both in sun or shade, and under all sorts of conditions. It is sometimes called the "poor man's bromeliad" because it is about the cheap-

*Aechmea lamarchei*



est species available. At one time single offshoots were sold for 10¢. The grass-like leaves grow in tufts and from it spring drooping spikes of oddly colored green flowers with a distinct blue edge. These are often used by flower arrangers.

*Billbergia pyramidalis.* An old timer with a rather compact head of reddish blossoms with violet tips. The form formerly known in the trade as *B. thyrsoidea* produces broader and brighter green foliage with denser scarlet heads of flowers. It is one of the most colorful bromeliads that I know and also one of the prolific propagators as it develops into huge clumps.

*Billbergia saundersii.* This one possesses highly colored and spotted leaves which make it another must for the collector. If grown in deep-shaded positions the spots may almost disappear from the leaves. When in flower the brilliant deep red bracts and dark blue flowers are very showy.

*Billbergia zebrina.* Produces tall fluted gray green foliage with vivid silver zebra bands that make it such an outstanding decorative plant—one of the most highly prized bromels to ever come out of Brazil. Inflorescence is a drooping spike with satiny green flowers and luscious rose bracts.

*Cryptanthus bivittatus.* A large flat species with gaily colored and crinkle-edged leaves remindful of a starfish. Salmon rose stripes alternating with light chocolate ones make it a highly prized ornamental. Like the rest of the Cryptanthi, the flowers are white barely emerging from the center of the plants.

*Cryptanthus fosterianus.* One of the

*Tillandsia butzii* (See p. 19)

*Billbergia euphemiae* (See p. 12)

*Aechmea victoriana* (See p. 11)

most beautiful of "earth stars"—a common name which Mulford Foster coined for the Cryptanthi because they form a star-patterned carpet of intriguing hues. This particular one has wavy cross bars of more precise and narrower bands than the following and can be likened to a more sophisticated cousin of it.

*Cryptanthus zonatus.* A short stemless rosette of dull purple-grey leaves marked with wavy cross bands of white, suggesting zebra stripes. Cryptanthus is a terrestrial plant, extremely robust, and makes an excellent house plant.

*Dyckia fosteriana.* A sun lover and like all the Dyckias prefers conditions

*Billbergia horrida tigrina* (See p. 12)

*Tillandsia ionantha* (See p. 19)

enjoyed by cacti and other succulents. The spidery plants look more like a large piece of platinum jewelry. The plants develop double heads and eventually make mounds if grown in a large enough pot. The flowers are golden.

*Dyckia* × 'Lad Cutak.' This is a hybrid with bronze-red leaves and orange flowers honoring the author. Mulford Foster, the hybridizer, claims it to be the most vigorous grower and bloomer of any of the Dyckia family.

*Dyckia leptostachya.* The leaves of this one vary from maroon to green and the rich orange flowers are pro-

*Aechmea weilbachii leodiensis*

*Billbergia pyramidalis*

*Vriesea splendens*

duced on spikes up to two feet high.

*Dyckia microcalyx.* One of the most floriferous of all Dyckias with hundreds of yellow flowers on branched flowerstalks. In warmer climates it is an excellent outdoor rock garden subject.

*Dyckia sulphurea.* A small heavy clustering bright green plant excellent for dish gardening or rockeries in warm regions. This one is probably the commonest species to be found in collections.

*Fosterella penduliflora.* A low terrestrial bromel with herbaceous grass-green foliage, looking somewhat like a Cryptanthus. It is quite a common species with delicately formed branched spikes with many tiny white flowers.

*Guzmania danielii.* I first saw this giant bromeliad in the rain forests of Colombia and was impressed by the large reddish green rosettes perched high in trees. Most of the Guzmanias are spectacular plants; they need plenty of humidity and warm air and prefer shade.

*Guzmania lingulata.* This is very popular and most often seen in cultivation. It is quite a variable species with either smooth green or red leaves while the colorful inflorescence emerges from the rosette and lasts for weeks, usually with crimson or scarlet bracts and small yellow-white flowers.

*Guzmania monostachya.* This is another beautiful species having an extensive range from southern Florida all the way down to Brazil. A stiff poker-like spike of white flowers subtended by brilliant crimson to orange bracts emerges from a dense bright green rosette.

*Guzmania musaica.* A valuable foliage epiphyte with purple-tinted green leaves that are peculiarly marked with fine wavy lines of red-brown. A variety *zebrina* is even more showy because the fine lines are compacted into definite zebra bands. Both the type and the variety exhibit a thick waxy head of orange yellow flowers.

*Guzmania zahnii.* Produces loose rosettes of strap-shaped papery green leaves marked by dark red longitudinal pencil stripes in the basal portions. An erect showy flowerspike with yellow flowers enhances the plant very much. Most Guzmanias prefer filtered light and should be planted in straight osmundine fiber for best results.

*Hohenbergia catingae.* A stiff-leaved bromel interesting to gardeners who prefer xerophytic plants. The white and pale green inflorescence is not particularly showy even with its multiple heads.

*Hohenbergia stellata.* A rather showy plant with rigid spinescent foliage in a crateriform rosette from which arises an erect stiff inflorescence bearing a brilliantly-colored branched panicle of densely crowded red bracts and blue flowers.

NEOREGELIAS are very distinct and decorative plants for the home. Its members have long been established in collections and we know that they can stand quite a bit of accidental abuse.

*Neoregelia ampullacea.* The interesting feature of this plant is its stoloniferous habit thereby lending itself to hanging baskets. The leaves which form tubular spreading rosettes are lightly marbled throughout or flecked maroon.

*Neoregelia carolinae.* One of the most popular and showiest of all Neoregelias. The soft green leaves form a loose rosette and when the plant is about to bloom the center leaves color up a brilliant vermillion red. The variety *tricolor* is even more stunning, the leaves marked by ivory-white, lengthwise stripes of varying widths.

*Neoregelia marmorata.* What is sold under this name most likely is a stunning hybrid between *N. marmorata* and *N. spectabilis.* The green heavily maroon-blotched leaves form a very showy rosette which needs no flowers to make it desirable. The lavender-tipped white flowers are sunk in the water-filled cups.

*Neoregelia spectabilis.* This species can stand considerable cool weather and it may be easily recognized by the singular bright purple patch at each leaf tip. Because of this beauty spot it has received the name "Painted Fingernail."

*Neoregelia tristis.* One of the smaller kinds with upright habit. It has narrow bright green leaves with lively red-brown mottlings. Flowers are light lavender.

*Neoregelia zonata.* Another exciting foliage bromel, being both speckled and banded. It needs light to bring out the coloration and should be included in every collection.

*Nidularium fulgens.* Always a beautiful plant with glossy light green leaves that are copiously spotted throughout. Like the Neoregelias the

*Billbergia macrocalyx* (See p. 12)

*Quesnelia testudo* (See p. 19)

center leaves color up a brilliant cerise when about to bloom and usually lose this coloration when flowers disappear. The flowers appear deep in the center of the heart and do not open fully, usually being white.

*Nidularium innocentii.* One of the old time favorites with plain green leaves, the inner cluster turning red at the tips when ready to flower. There are two varieties that are greatly in demand. Variety *lineatum* is probably the handsomest because the leaves are finely penciled with longitudinal white stripes. Variety *striatum* as the name suggests has leaves more broadly ivory-yellow striped than penciled white.

*Nidularium regelioides.* A very attractive plant forming a compact rosette. The dark green leaves are faintly spotted. Flowers are deep orange.

PITCAIRNIAS usually produce long, grasslike leaves in tufts, oftentimes densely scurfy on the undersides and although hardly suitable for the home because of their size there is no reason that smaller plants confined to pots not exceeding 5 inches would not make excellent house plants. There is something graceful about Pitcairnias which almost reminds us of the Chlorophytums, better known as "Airplane Plants."

*Pitcairnia andreana.* This is one of the dwarfs with very few leaves in a tuft and a delicate flowerspike only a few inches tall. It will flower in a two-inch pot, the flowers quite large, shading from scarlet to bright yellow.

*Pitcairnia corallina.* The slightly corrugated broad leaves of this bromel remind one of the weevil plant, *Curculigo capitulata.* It is unique in that its inflorescence of bright red flowers arises from the base of the tuft of leaves, then abruptly curves downward and lies flat on the ground. Individual flowers are at least 3 inches long.

*Pitcairnia heterophylla.* A widespread species first introduced into cultivation in 1838 from Mexico. The pinkish to bright red flowers appear in a capitate, nearly sessile spike.

*Pitcarnia xanthocalyx.* This species is most often seen in Florida gardens. It is a dense stemless terrestrial with dusky yellowish green leaves, the undersides covered with a membrane of whitish scales. The flowers are light yellow and abundant on an erect stalk. This one is said to withstand low temperatures in Florida.

*Quesnelia liboniana.* A tall green

tubular plant that reproduces easily by means of long stolons. From the stiff vase of leaves a fairly graceful flowerstalk emerges that is usually beautiful because of its color combination. The individual flowers sit on the stalk and show a scarlet ovary, burnt orange calyx and a deep purple corolla.

*Quesnelia marmorata.* Shaped like a classical Grecian vase and as delicately colored. The long greyish green leaves spotted with maroon and green form a tubular plant from which the outer leaves spread like a fan. Blue-petalled flowers are subtended by rose pink bracts. Include this on your list.

*Quesnelia testudo.* A robust grower for the sunroom. Its flowerstalk looks so artificial—looks as if it would be made out of pink crepe paper that has been waxed to stiffen it. Blue flowers issue from between the bracts of the torch-like head.

The Tillandsias constitute one of the largest groups in the entire bromel family. Some of the species, even though they are epiphytes, exhibit a xeric habit and their coverings of tiny peltate scales act as minute sponge cups to hold water and help them to survive long periods of drought. Among these xerophytic Tillandsias there are many dwarf kinds suitable for the windowsill. One of these is a botanical oddity, *T. bulbosa.* As the specific name suggests, a hard pseudobulb is formed by the leaf sheaths from which the hard spirally twisted blades protrude. Another near relative worthy of cultivation is *T. butzii,* which is conspicuously spotted with purple. It also has a pseudobulb but is smaller in all its parts than the former.

*Dyckia fosteriana* (See p. 14)

However, the best of the lot is *T. ioantha,* a saucy, dwarfish, tufted epiphyte, only 3 to 4 inches high. The succulent leaves appear as if coated with sugar since they are covered with coarse spreading silvery scales. When the little plants are about to bloom the tips of the leaves assume a brilliant red color. Dark violet tubular flowers are few and emerge from the tuft of silvery leaves.

All Tillandsias need plenty of air—for in their natural habitat they grow high on trees. They do well planted in osmundine for pot culture or they can be firmly fastened to tree branches, the roots wrapped in sphagnum moss or better still, osmundine. They'll need daily misting of water for best results. Some of the more outstanding ones of less xeric habit are the following:

*Tillandsia cyanea.* Sometimes considered to be the showiest member of all Tillandsias. It is a stemless plant with stiff grasslike leaves, the short scape arising from the center of the rosette terminating in an elliptical to fan-shaped blush pink spike with large dark violet flowers.

*Tillandsia lindeni.* Like the above, this species is a sensation in the bromel world. In many respects it is similar to *T. cyanea* but it has a much longer flowerspike which towers above the leaf rosette and the coloration is deeper, being a vivid watermelon red rather than lovely pink. The colorful spikes of the above two keep on producing rich purple flowers for weeks and that is why *T. cyanea* and *T. lindeni* are considered to be the most prized bromels.

*Tillandsia streptophylla.* Because Tillandsias vary in size from a few inches to grandiose specimens and there are hundreds to choose from, it is impossible to touch upon too many; however the Mexican *T. streptophylla* should be mentioned as one of the more curious. Its twisted leaves spread out in octopus-like fashion and from the rosette emerges a small, branched flowerstalk, completely covered with gray scales, supporting tubular lavender flowers above pink bracts.

*Tillandsia usneoides.* Probably the most unusual member of the Bromeliaceae, as it hangs in bunches of many lengths from the branches of trees. It is so curious that it is commonly known as 'Spanish Moss' and very few people realize that it flowers and is related to the pineapple. There are no visible roots except in the seedling stages and the plants grow luxuriantly in midair.

VRIESEAS are closely allied to Tillandsias and many of them are startling foliage plants while others are noted for their brilliant flower spikes. Some of the plants are mere dwarfs although a few attain giant proportions but the vast majority can take a four or five inch pot. They do best in a greenhouse where humidity is constant and then can be brought into the house to grace a table or mantelpiece when in bloom.

*Vriesea guttata.* An intriguing dwarfish plant with dull blue-green leaves flecked with maroon spots and an inflated pink-bracted flowerstalk producing pale yellow flowers.

*Vriesea hieroglyphica.* Some consider this one of the most stunning of the group. In European homes it has been a favorite for over a century. Its green leaves are marked by zigzag mottling, resembling primitive glyphs, and, when viewed high on a branch with the sun shining through, it presents an inspiring sight. The flowerspike is not interesting as it is strictly a colorful foliage plant.

*Vriesea scalaris.* A small bright green loose rosette that produces a slender pendent inflorescence supporting a few yellowish flowers suffused with red in the basal portions.

*Vriesea splendens.* An outstanding member of this group because of its broad green leaves marked with very distinct, broad, wavy zebra stripes of purplish black. It is a great favorite in Europe and its swordlike inflorescence retains its brightness for a long time. It is sometimes known as the 'Flaming Sword.'

L. CUTAK

# MISSOURI BOTANICAL GARDEN

# Bulletin

February 1967
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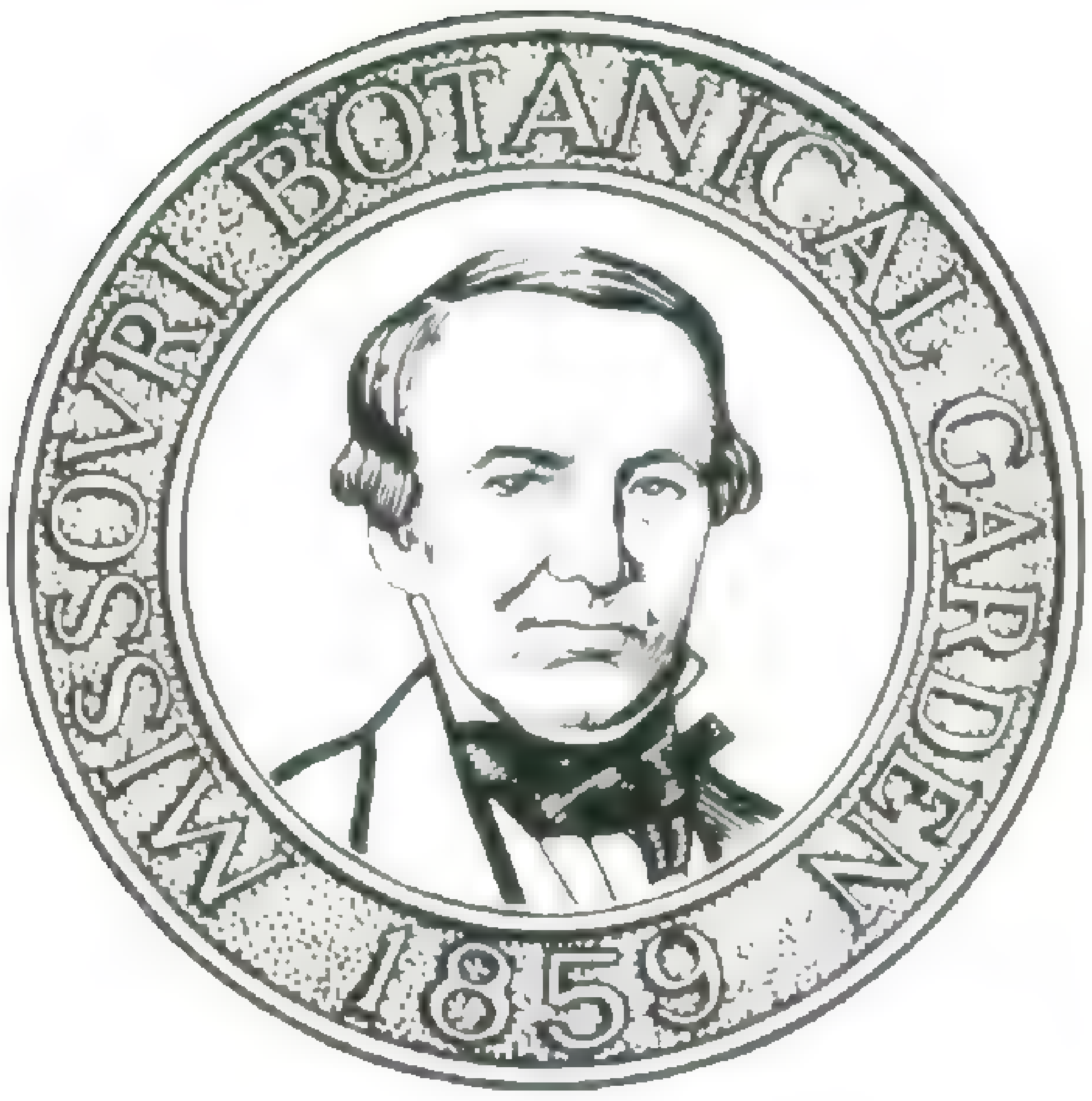
THE GARDEN'S ANNUAL REPORT FOR 1966



COVER: Three key figures in the Garden's resurgence. From left to right, Leicester B. Faust, out-going Vice-President of the Board of Trustees; Henry Hitchcock, its out-going President; and David M. Gates, the Director.

Appropriately the photograph was taken on a sunny day in spring when the ginkgos were coming rapidly into leaf. In back of Mr. Hitchcock and Dr. Gates is Henry Shaw's Town House now restored to much of its original dignity. Adjoining it on the left, the remainder of the Administration building, now filled to overflowing with the Library and Herbarium established by Henry Shaw.

Since October the BULLETIN has been using the Garden's new seal, made from a fine portrait of Henry Shaw as a vigorous man in his early sixties. It bears the date 1859 when he dedicated his new Library and Herbarium.

The seal formerly used was made for the Board of Trustees in 1889 when they took over their responsibilities and needed an official seal for legal matters. Appropriately it was made from one of Mr. Shaw's last pictures and shows a dignified old gentleman, the most distinguished citizen of the City of St. Louis.

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# Missouri Botanical Garden Bulletin

Vol. LV No. 2 February 1967

## ANNUAL REPORT

DAVID M. GATES

SOMETIMES the best things in life are those we take for granted, yet if we did not have them we would suffer incredibly. And so it seems, the Missouri Botanical Garden often is taken for granted as an institution which has always been a part of our lives and of those before us for many generations. Yet this manifoldly essential institution had approached the brink of disaster, then rallied, gained support and is now building for a secure and exciting future. The activities of the Garden assist mankind in so many ways it is almost trite to mention them; yet let us review them briefly.

The Garden is one of the few great institutions of the world whose every effort is devoted to the understanding, teaching-about, and enjoyment of plants. The vegetated surface of the world gives us the beauty, form, and variety around us, it shades us from the sun, shields us from disturbing noises, partially cleanses the polluted air, holds back floods and erosion, cools the air during hot summers, and diminishes the winds which encircle the globe and punish our farms and homes. Man relies on plants as the basis of all food, for pharmaceuticals and medicinals, for building materials, for fibre, for landscaping and for recreation. The people of this planet cannot do without plants nor can they manage a complex society without understanding the plants with which they are so intimately intertwined. Yet our exploding and exploiting population has neglected its responsibility towards the future progeny of the planet. Henry Shaw created the Missouri Botanical Garden with all the foresight and wisdom he could muster to give mankind a real basis for a rich and secure future. There should have been Henry Shaws in every major population center and yet there were not. This man was unique among philanthropists of the world and as a result the Garden stands as one of very few great botanical institutions whose contributions to our lives have been immeasurable.

It is to the premise that the Missouri Botanical Garden is absolutely essential to all future generations of mankind that the staff has devoted itself relentlessly during the last year. Because of long years of financial stress the Garden activities and facilities required much rebuilding and reconditioning. Last year we took first things first and made encouraging progress on many fronts. It is our intention that the

Missouri Botanical Garden be absolutely first rate in those things of which it is capable and which Henry Shaw believed were necessary for the people of St. Louis and beyond. This annual report is a review of parts of this progress and an assertion of our expectations.

The word Garden, in the name of this institution, is perhaps somewhat misleading to the general public, which conceives of a garden in the context of a plot of ground with flowers and shrubs and paths. The Missouri Botanical Garden is a showplace on the surface but within its corpus it is an energetic, exciting aggregation of busy scientific investigators probing the secrets of the plant world and turning their knowledge toward the benefit of people. The tradition for doing so has been clear; the future responsibility for continuing to do so is self evident. The herbarium of two million pressed plant specimens within our walls is an irretrievable record of the plants of the world before man overran, disrupted, and in various ways changed the natural plant communities which took millions of years to evolve. The library of the Garden contains five centuries of man's inquisitive probing into the properties and interrelationships of plants as written, printed, drawn and pictured in 65,000 volumes, and 100,000 pamphlets of precise botanical information. The assets of the library and herbarium are to the scientist as the mother lode is to the prospector. We have the mother lode of botany and intend to mine it effectively. The herbarium and library will continue to be built and strengthened, for hundreds of thousands of plant species remain undiscovered; hundreds of books and thousands of papers are written each year containing new botanical knowledge. The Missouri Botanical Garden will continue to devote itself to the study and teaching of plant systematics, plant genetics, and ecology and in addition it will contribute significantly to horticulture, gardening and to many aspects of those plants associated with man.

During the last year nearly every building at the Garden was painted inside or outside. The new Park Building with offices for the gardening staff, and a new head house was completed as well as four new greenhouses. Two of the greenhouses of the orchid range and the fronts of the two desert houses were rebuilt. The walks of the Linnaean Garden, the main Rose Garden and adjoining areas, were resurfaced; many were lined with steel edging. Installation of a new low-pressure boiler system was begun. Lawns were improved, new turf set in where necessary, trees trimmed, and many lesser improvements made throughout the grounds. Every effort was made to make the public appearance of the Garden as attractive as possible.

The vitality of an institution such as ours is largely demonstrated by the number of students studying and doing research using our facilities. The establishment at Washington University by the Public Health Service of the Center for the Biology of Natural Systems has meant much to the Garden in the way of additional research support and in financing fellowships

PHOTO C. JOHNSTON

The Old Museum Building, after minor repairs and new paint, sparkles in the winter sunshine.

and research assistantships here. This program has helped to attract students and to revitalize much of our graduate education program. In addition, new staff members are attracting graduate students at a rate not witnessed here for several years. There are 8 students of taxonomy currently enrolled, 4 ecology students and 4 postdoctorals. The number will increase this coming year.

Much time was spent this year planning a new Herbarium-Library building and preparing a proposal to the National Science Foundation for support of its construction. This building is to be contiguous with the present Herbarium–Library–Administration building and is to be connected with corridors. The new building will contain all of the library and approximately half of the herbarium. On the main floor is planned a reading room for the public and a separate exhibit room for the display of many of the rare and interesting botanical books in our collection. There will also be a flora of Missouri with a contiguous area for displaying some of the remarkable and historically significant preserved plants from the herbarium. Upper floors will house the main elements of the library and herbarium. Laboratory space, service facilities, and storage space will be provided in the basement.

For the first time in the 107 year history of the Garden an admission charge was initiated at the main gate. After studying many plans it was decided that 25¢ would be charged for persons 13 years of age or older. Simultaneously the charge at the Climatron was reduced from 50¢ to 25¢, based on the assumption that a greater percentage of persons entering the main gate also would enter the Climatron. This has proven to be true. The charge at the main gate was necessitated by the difficult financial situation at the Garden and the fact that the Garden receives no direct City or State tax support. Henry Shaw made a list of recommendations concerning the Garden, separate from his Will, and in these he recommended that if financial circumstances should dictate he would recommend an admission charge. It is too early to say just what difference on income a charge has made, but it has definitely brought in additional money. In order to facilitate collecting admissions, turnstiles and gate house were installed at the main gate. The charge has reduced the amount of litter dropped in the Garden, reduced vandalism, and in general improved the quality of the visitors. Local residents wishing to visit the Garden regularly have been taking advantage of the one dollar annual pass.

As a part of the effort to attract more visitors to the Garden an attractive brochure was printed and distributed in June 1966. We printed 100,000 copies and about 50,000 have been distributed to motels, hotels, travel bureaus, visitors centers, airlines, bus depots, railroad stations, filling stations, Chambers of Commerce and elsewhere. Southwestern Bell Telephone Company generously assisted with the planning and layout of the brochure, for which we are very grateful indeed. The brochure has received wide acclaim and we feel certain it has brought many visitors to the Garden.

A most significant event occurred this year when the National Council of State Garden Clubs, Inc., adopted unanimously a resolution to raise funds for our library. They are planning to furnish the exhibit and reading rooms in our new Herbarium-Library building and to recondition many of our great books of botany, horticulture, and gardening. The National Council began this project in July 1966 with a $10,000 contribution from their treasury. Although the drive has just begun, the amount contributed through the National Council during 1966 was approximately $2,000. Other individuals and organizations have become interested in our efforts to rehabilitate the Library and thus far, the Garden has received numerous contributions from such sources. We are eternally grateful for the interest of the members of the National Council of State Garden Clubs, Inc., in the future security and well being of this great library. The library is truly a national asset which is used by scholars throughout the country and when properly housed and restored will play an increasing role in the lives of those interested in plants.

At the time of the annual meeting of the American Institute of Biological Sciences at College Park, Maryland, in August 1966, an organizational meeting of the Alumni of the Missouri Botanical Garden was held. Dr. and Mrs. Frederick Meyer generously acted as host and hostess to the group for a breakfast held at the National Arboretum. About 25 were in attendance. Many more would have been there except for the airline strike. Dr. Gates reported to the group concerning progress at the Garden and future plans. The alumni present were enthusiastic for the idea of forming an Alumni Association. Plans for doing so were formulated and during the winter all potential affiliates will be contacted and the alumni Association of the Missouri Botanical Garden will be officially organized. It is planned that an annual meeting be held at the time of the AIBS annual meetings or at other times when desired. The alumni of the Garden can be very helpful to the staff in many ways—by writing articles for the BULLETIN, by giving talks about the Garden, by directing outstanding students to the Garden for advanced degree work or postdoctoral work, or by their moral support of the institution. We hope that those participating in the organization will find it rewarding and that they will feel some of the comradeship which has been so characteristic of the students and staff of the Garden during past years.

The Director takes this opportunity to thank all those voluntary groups who have worked so hard during this last year to make our efforts at the Garden a success. Special thanks go to members of the Board of Trustees, the Executive Board of the Friends of the Garden and its Committees, the Horticultural Council and the many horticultural societies and individuals that participate in Garden activities.

The enthusiastic participation of all these people has been heart-warming to our hard-working staff and has been an important force in achievements at the Garden this last year. In addition many individuals, foundations, corporations and organizations have responded generously to the financial needs of the Garden. For this help we are grateful beyond words. By helping the Garden you have helped yourselves, your community, and you have played an important role in bringing increased knowledge and enjoyment concerning plants to the people of the world.

## HORTICULTURE

A MAJOR change in the organization of the horticultural activities of the Garden was made in 1966. Dr. Derek Burch was appointed to the position of Chief Horticulturist in September. This new position placed Dr. Burch as the person in charge of all growing at the Garden—outdoors and indoors. Dr. Burch came to the Missouri Botanical Garden late in the summer of 1965 as Assistant Botanist in the Herbarium. His graduate education and research in systematics meshes nicely with considerable experience and a long time interest in horticulture (see article in BULLETIN, December 1965). This made him a logical choice for a new position of major responsibility.

The Park Building with a long interconnected headhouse and offices for horticultural supervisory personnel was completed in early spring. At long last, these members of our staff can work and write in cool, clean, quiet quarters. Constructed at the same time, and contiguous to the Park Building, were four new greenhouse growing-ranges. This $160,000.00 complex was financed by $96,000 from the James J. Park bequest and from generous donations by members of the Board of Trustees and other interested Garden patrons.

Before these new growing facilities were even finished they were occupied by the Floral Display crew under the direction of Mr. Paul Kohl, Floriculturist.

It is our goal to upgrade the quantity and quality of the horticultural activity at the Garden as rapidly as possible under our financial structure. Already knowledgeable visitors maintain that the Garden "looks better" than it has for several generations. Bettering the Garden horticulturally is a broadly coordinated movement involving every department of the Garden. Improvement of the Garden horticulturally will come through simultaneous improvement of our scientific, educational, administrative and physical plant operations as well as through growing more and better plants. A Botanical Garden must please and develop the mind as well as the eye.

### TROPICAL GREENHOUSES AND THE CLIMATRON

A start has been made on the rehabilitation of the tropical material with a view to gradually replanting some of the established display houses. Propagation of ground-cover and showy material for the Climatron is under way and this will be used to lend color to the edges of the jungle area. A regular spraying program has been instituted to prevent build-ups of red spider and white fly which cause heavy defoliation. The pruning system has been changed, and it is hoped that once the basic framework of the plants has been formed, pruning will be done in an unobtrusive manner so that there are never gaps and wounds in the display. The Balsa trees, tallest in the Climatron, required large-scale pruning which was accomplished in March with tall scaffolding and the assistance of the outdoor crew. At the same time tall Sterculia and Grevillea trees were also pruned.

Cycads, which had been maintained in cumbersome containers since the old Fern-Cycad room was demolished to make way for the construction of the Climatron in 1959, had about had all they could withstand. In order not to lose the valuable collection, it was decided to find a permanent home for them in the Climatron. The transfer began in early May and continued intermittently throughout the summer months, requiring the aid of the outdoor crew and the Neighborhood Youth Corps.

In August the Chocolate Manufacturers Association of the U.S.A. presented a large mature Chocolate tree *(Theobroma cacao)* to the Garden. The tree was grown at the USDA Station in Miami and hauled to the Garden by a Tropical Plant Transport Service, arriving on August 8th. The presentation was made by Mr. Edmond Opler, President of the Association, on August 12th.

The pool with the Aquatunnel

which had presented quite a problem with algae since it was installed in 1961, was drained and waterproofed, algacide was applied in April and when this was found inefficient, an ecological experiment was started by Dr. Bruce Parker of Washington University to shade out the algae with a solid cover of Azolla and Salvinia. A vacuum sweeper was bought and an extra filter installed in July. Large twenty-foot plastic rings were floated in the pool to confine the spread of the Salvinia and Azolla and within the rings tropical waterlilies planted in plastic tubs. With all this equipment and vigilant maintenance the problem of keeping the water and aquatunnel clear seems to have been solved. Restocking with fish has begun and the first batch of "young tropicals" are settling down and growing fast.

The Coconut Palm *(Cocos nucifera)*, as far as we know, has never bloomed in greenhouses anywhere in the Temperate Zone, and if this is so, then another first can be claimed for the Climatron. Several inflorescences have been produced on our tree although no fruits have made their appearance.

The Blue Jade Vine *(Strongylodon macrobotrys)* has also bloomed for the first time in the Climatron, the pendent blossoms appearing in June.

Waterlilies are a great summer attraction in the outdoor pools but propagation must be started early in the year. Gardener Charles Kreher has managed this since the death of Frank Korte in 1964. Propagations were started on February 10th from about 100 tubers and this was later increased to about 400 potted plants. Outdoor pools were drained on April 25th, gravel added as drainage to boxes on May 2nd, and soil with fertilizer the following day or two. Because of cool weather the waterlilies were delayed in being planted but this was accomplished on May 16th in the main pools and the Linnean pools on May 25th. Weather remained quite cool through June so that Lilies had a hard time to get established in the cold water where temperatures hovered below 70° F. Extremely hot weather occurred in July, and the tropical waterlilies picked up vigor and gave a good show of flowers throughout the summer and autumn; however, the Victorias never recovered fully and gave a rather discouraging display—the worst in the many years these Amazon Water Platters have been grown at the Garden. The pools were drained in late October.

### ORCHIDS

The routine work of caring for plants, which includes repotting, watering, feeding, controlling the temperatures, shading the greenhouses, etc., and the task of keeping up displays, occupied most of the time of the Orchid growing staff under the management of Mrs. Marian Pfeiffer. Besides the thousands of plants used in the annual Orchid Show and at various Garden functions, over 3000 flowering plants were used in the displays in the Climatron.

About 200 cool-loving orchid plants and many flower buds were lost in the extreme heat this past summer. Fans are needed in all the growing houses for better air-circulation in very hot weather.

Two new Garden orchid hybrids were named and registered—one as Cattleya MARY PLANT FAUST; the other as Laeliocattleya ELEANOR H. HITCHCOCK.

About 300 new plants have been added to the collection. Eighty-six very fine plants were given to the Garden by Mr. Norman Leppo, of Clayton, Mo.; also a group of 100 plants was donated by Mr. H. L. Dillon of Long Island, N. Y.

### DESERT AND SUCCULENT COLLECTIONS

The appearance of the two Desert Conservatories, especially their front façades, has been a disgrace ever since the Palm House was demolished and the Climatron constructed in 1959. Relatively little attention has been paid to these structures and the plant collections inside for years. We began to rectify this situation in early 1966 when architects were asked to design new fronts for the buildings more in keeping with the adjacent, dominant Climatron. Using drawings of Architects Murphy and Mackey, contracts were let in early autumn. Bilhorn Construction Company began work in November and at the time of this report only a few final touches remain unfinished.

The Garden's maintenance crew carried on an extensive painting and general "sprucing up" campaign on the Desert Houses at various times through the year. More is to follow. Plant maintenance was increased with a view to the near future when major rehabilitation of these plant collections is anticipated. Many of the desert plants of this previously fine collection are too old, scarred and misshapen to look attractive again. We must plan on propagating fresh material, new additions and new arrangements and again present a desert and succulent collection in keeping with the historically prominent position these fascinating plants have had at the Missouri Botanical Garden.

### FLORAL DISPLAYS, FLOWER GARDENS AND BEDS

Mr. Paul Kohl, Floriculturist, is responsible for most of the floral displays both inside and outside (with the notable exception of the two rose gardens). Displays were generally at their usual high standard, but the intensely hot dry July and limited growing house space through most of the previous winter presented some insurmountable problems. There is always, of course, a shortage of skilled gardeners and an inadequate budget for labor, to develop and maintain many floral displays. Instead of trying to present too many displays, we attempt to do a fine job with the ones currently maintained. Mr. Claude Johnston, long-time Grower at the Garden, is chiefly responsible for the planning and day-by-day care of the thousands of potted plants being grown for the flower displays.

The Floral Display House was being painted in mid-winter so the Poinsettia Show had to be shifted frequently to clear paths for scaffolding. At the same time many of the trees growing permanently along the sides of this large house were pruned. From January 16 to 30 a display of Primroses and Cyclamen were in the Floral Display House. The Orchid Show opened with a Preview Party for the Friends of the Garden on February 4 and continued through March 20. This was scheduled as the longest Orchid Show ever held at the Garden, and yet we kept it over for an additional week to accommodate a special group of visitors on tour in St. Louis on March 19.

In early February, benches in the four new greenhouses were given a layer of gravel preparatory to moving-in plants. In succeeding weeks, plants were gradually assembled from various temporary quarters in other greenhouses and placed in the new houses. It will take us at least a year to adjust our schedules to using the new houses. The extremely hot weather in July did at least give us an opportunity to study the houses under limiting conditions. Greenhouse management during extreme weather conditions is always a problem.

On April 1, the Spring Flower Show opened with a Friends' Preview Party and also featured a "kickoff" for the Arts and Education Fund Drive.

Hydrangeas were displayed from May 28 through June 26 and in July, August and September, begonias, caladiums, gloxinias, fuchsias, and foliage plants were displayed in the flower house.

The Chrysanthemum Show opened with a Preview Party on November 4, and on December 4, the Poinsettia Show closed out the year in the Floral Display House with another fine Preview Party.

Many local horticultural organizations are given permission to present their own displays and competitive shows in our facilities at no charge. During 1966 the following organizations held shows at the Garden: the Metropolitan St. Louis African Violet Society, the St. Louis Daffodil Society, the St. Louis Horticultural Society, the St. Louis Herb Society (a sale in the Museum), the Greater St. Louis Hemerocallis Society, the Henry Shaw Cactus Society, the Midwest Regional Council of Men's Garden Clubs, the Greater St. Louis Dahlia Society, the Rose Society of Greater St. Louis and the Mississippi Valley Guppy Club.

Most of these organizations use the Museum Building for regular meetings and several additional organizations do likewise. In addition, several horticultural organizations use our facilities for annual banquets and pot-luck dinners. All this is in keeping with the Garden's desire to foster more interest in the world of horticulture.

The collection of camellias was maintained in the Linnaean House by Mr. Kohl's crew and also outside gardens including the Linnaean Garden (under immediate care of Mr. Charles Kreher, Gardener), the main garden beds, the Herb Garden, the "Old Fashioned Garden" adjoining Henry Shaw's Tower Grove House and the collection of Azaleas. Since none of these Gardens had an underground watering system, much time was spent moving sprinklers during the unusually hot, dry, summer months.

The two Rose Gardens at the Missouri Botanical Garden continued to improve through the constant care of Mr. Alfred Saxdal, Rose Grower. Rose specialists around the country are becoming increasingly aware that our collections, while not as extensive as some of the rose gardens across the continent, are as well managed as possible under the rather stiff environment imposed by St. Louis climate.

### GROUNDS

The improvement in the overall appearance of the grounds since they became the responsibility of Mr. Hampton continued during the year in spite of record-breaking heat. The long-term program which has called for reconditioning of planted areas to be followed by work on the grass and on trees and shrubs is well under way. The improvement in the overall quality of the grass has had the unfortunate effect of making the unimproved areas more noticeable than they were before. Some of the major projects accomplished by the Grounds crew during the year includes extensive filling and grading in the north end of the Garden and resodding of many areas where crab grass was dominant. We used blue grass sod grown in our own turf nursery in the northeast corner of the grounds. The trellis around the south half of the old Rose Garden was repaired and painted and new trellises were placed at the north end of the Lehmann Rose Garden. Over two hundred assorted azaleas were planted in a border around this Garden replacing some old fashioned bush roses which were doing poorly in the shade of nearby trees. The new Park Building and the front of the Administration Building were landscaped.

A number of mature trees (mostly elms and sycamores) died from disease and had to be removed. All wood must be burned from diseased trees and such tree removal takes a prodigious amount of hand labor.

The Garden has been in need of a general tree trimming program for years. Each wind storm bears this out with many dead limbs littering the grounds after a blow. Our crews can accomplish a limited amount of trimming but professional crews with proper equipment and safe techniques must do the major work. This ever-growing problem will continue until funds can be found to bring in an outside firm.

A large lawn aerator was purchased and effectively used for better water penetration in our turf.

During the long, hot, dry spell, it required all the time of one man to move hoses and sprinklers in keeping lawns and flower beds alive and presentable. Such extensive watering in midsummer can invite germination of weed grasses and annuals which must be coped with later.

Mr. Joe Baker continued as a capable Grounds Foreman in 1966.

### PLANT LABELER

The addition of a plant labeler to the staff and purchase of a new engraving machine has allowed many new directional and informational signs to be placed in the Garden. In some areas the bulk of shrubs now have new, permanent labels of a standard design. This work is continuing and will eventually be tied-in to a map of the Garden giving the location of all plant materials.

### Exchanges and Accessions

Seeds, cuttings and rooted plants have been received from a number of Gardens to extend our greenhouse collections and for outside planting. Very little new material is being sought at the moment while an assessment of our collections is under way, but a particularly fine group of *Gesneriads* was received from Mr. Paul Arnold, a specialist in that group. The Garden has published no seed or exchange list, but has supplied research and decorative material to a number of institutions in all parts of the country.

### Arboretum

The Arboretum is again becoming a scene of renewed activity after several years of almost minimal attention. Mr. Frank Steinberg and his small crew continued to keep its 1700 acres in marvelous condition as they have for so many years.

Superimposed upon such routine activities were increased visits for research, study, education and recreation. Local Universities and Colleges sent biology classes out for field trips and study. Several out-of-state University botany classes spent time there on cross-country trips and during the annual Systematics Symposium, several score scientists from all around the nation visited the Arboretum on a specially arranged field trip. Dr. Anderson's course "The Dynamics of our Landscape" was well received in the spring and this type of activity has much carry-over and spin-off relating to future Arboretum use.

There is one special type of use by Garden staff at the Arboretum which has proved to be quite effective and is a very logical use of that facility. Now that the large, old brick house ("the Manor House") has been completely furnished by the ladies of the Historical Committee, it is a fine place for members of the staff to escape from the routine irritations of the telephone, visitors, appointments, etc., to undertake quiet writing, planning and research.

The Arboretum continues to be the scene of regular organized visits by the St. Louis Audubon Society, the Greater St. Louis Chapter of the American Youth Hostel Association and other outdoors-loving groups. Of course, many people come to the Arboretum as individuals just for a place to walk leisurely without the diversion and associated litter, noise and human impact of average parks which allow picnics, camping, fires and parties.

## EDUCATIONAL PROGRAM

One of the least publicized but probably most important programs at the Garden is the Educational Program for children and adults in botany, horticulture and natural history. It is primarily through such activities that interest in plants and in our Garden will be perpetuated.

Mr. Kenneth Peck, Head Instructor, is completing his 10th year of service in our Educational Program. He has seen it grow from a very small, part-time horticultural program for adults, to a full-time program which places equal emphasis on school-age children receiving education in the world of nature.

In early November Mrs. Angela Branson joined the Education Department as assistant to Mr. Peck. Her efforts have greatly enhanced the operation of the Department, in spite of the fact that our budget permits us to hire her only part-time.

Increased research activities at the Garden placed a huge load on the Experimental Greenhouse building which also houses the Education Department. The back room in the basement, previously used solely by Mr. Peck and his Pitzman staff in the summer, has been taken over by three graduate students and a visiting post-doctoral research scientist. The entire basement of the Experimental Greenhouse has just been cleaned and painted. The classroom was partitioned, providing an office for the Education Department. One of the two greenhouses is now completely devoted to research, as is the office-laboratory upstairs previously used by Mr. Peck as a winter office.

All these changes create new problems for our educational activities. Although the situation is partially alleviated by renovation and better use of existing space, the need for new education facilities is rapidly becoming urgent. We cannot expect the educational program to grow at the Garden without the larger and better quarters and additional staff.

The following statistical breakdown reflects the total number of visits to the Garden in all phases of the Educational Program in 1966.

| | |
|---|---|
| Saturday Morning Program for Children | 2,569 |
| Tours of Climatron and Grounds | 1,402 |
| Self-Guided Scheduled Tours | 17,713 |
| Plant Science Program for Grade-School Children | 5,273 |
| Pitzman Nature Programs for Children | 3,807 |
| Adult Courses and Teachers Workshop | 1,175 |
| Total | 31,939 |

### Saturday Morning Program for Children

Even though this program was not extended through the summer months this year, total annual attendance was about the same. Therefore, average attendance per class meeting was substantially larger than in 1965.

Beginning in early October a volunteer from the Junior League regularly assisted Mr. Peck in the Saturday Morning Program. This volunteer program will continue into 1967 with each volunteer serving 12 weeks.

### Tours of Climatron and Grounds

For several reasons this program was not as popular as in previous years. First, with informational signs and plant labels, the need for a guided tour was reduced. Second, members of our staff were so busy with regular assignments that appointments could not be worked out for each group. Finally, many teachers preferred to schedule a meeting for a Plant Science Program rather than to have a guided tour.

### Self-Guided Scheduled Tours

Through the year scores of groups make reservations to visit the Garden. Better than 80% of these are school age children accompanied by teachers and adults.

### Plant Science Program for Children

Any school class, grades 4–8, may participate in this program. A teacher brings a class to the Garden after making a reservation for a lecture in botany or horticulture. The level of each lecture is keyed to the grade level of the children and if desired, teachers may have a class receive a series of interrelated lectures. The number of children participating in 1966 was nearly double that of 1965.

### Adult Classes

A total of 10 adult courses were given in 1966, and of these, three were new courses. "The Dynamics of our Landscapes" taught by Dr. Edgar Anderson met at the Garden's Arboretum at Gray Summit from late March to early May. This course demonstrated some of man's chief effects on the vegetation during the last 125 years; there were discussions of ecology, taxonomy, horticulture, wild flowers and the care and improvement of wild-life areas.

In spite of a cool, cloudy spring, the course was conspicuously successful and will be repeated in the Spring of 1967.

Mrs. Kay Hert taught a very well received course, "The Fundamentals of Bonsai," at the Garden in March. This course will also be repeated in 1967.

Dr. Anderson and Kenneth Peck combined to teach a course, "Winter Botany," in November and December. It dealt with the identification of trees in winter, the various patterns of bud organization and twig development and the relations of these technicalities to identification and pruning.

The other seven courses, which have also been offered in previous years, were given by Clarence Barbre, Ray Freeborg, Robert Gillespie and James McCaskill.

### Teachers' Science Workshop

In February and March, in cooperation with Harris Teachers College and the Association for Childhood Education, the Garden sponsored a Science Workshop for teachers. The purpose of the workshop was to inform teachers how to use the Garden as a science resource. It also served as a refresher course for the 90 teachers who attended the 4 four and one-half hour meetings for one hour of college credit. Teaching in the workship were: Edward P. Ortleb, Elementary Science Supervisor in the St. Louis Public Schools, Lad Cutak, Kenneth Peck, Edgar Anderson, Derek Burch, David Gates and Walter Lewis.

### Pitzman Nature Program for Children

For nine years, the Garden has been privileged to offer a nature study program to young people in a metropolitan community. These summer programs have been made possible by grants from the Pitzman Charitable Trust. In reporting on the last summer's activities, the Garden gratefully acknowledges the grant that made the program possible.

The total participating enrollment for the summer was 553 youngsters, which is a little below last year's attendance. Certificates for successful completion of the program were received by 421 young people. Classes were held four days a week, the majority of them being given out-of-doors. Rain was not as discouraging as extreme heat, and the above figures are encouraging in the face of two weeks of torrid temperatures.

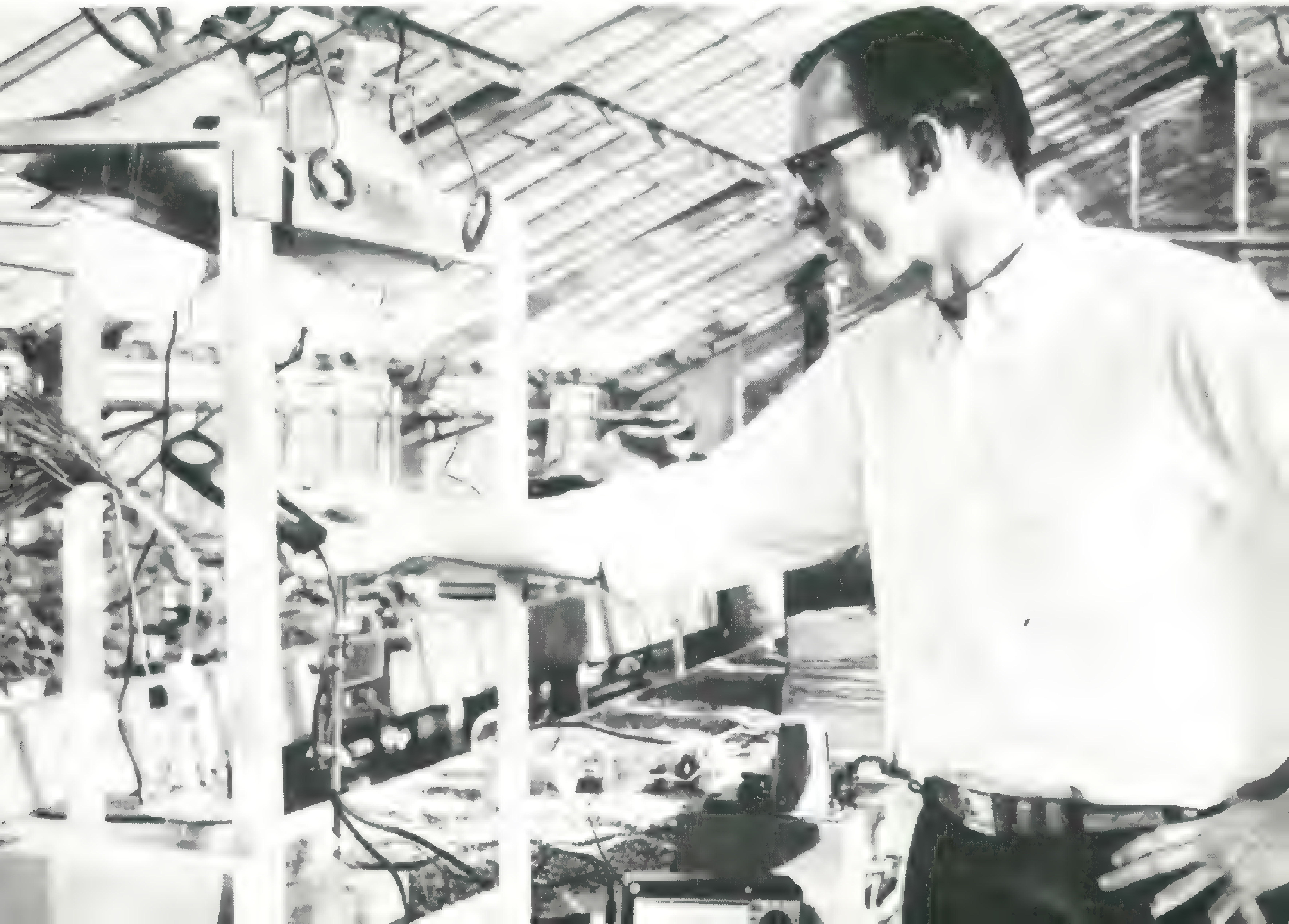
Two of the courses offered were revised and given new names. "Trailfinders" was changed to "Field and Forest" to reflect an ecological emphasis, while "Man's Enemies" was changed to "Partners with Nature." The former studied plants as they formed communities and from leaf collections; the latter was concerned with edible and poisonous plants, wilderness survival, and insect collections. The Bird Study course was once again made possible through the active cooperation of the St. Louis Audubon Society and its President, Mr. Earl Hath. The principal instructors in the "Bird Study Course" were Mrs. Lanier Criger and Miss Sarah Owen. Assisting them were Mrs. Pauline Heflin, Mrs. Robert Higgins, Kenneth Olsen, Henry Pelzo, and Robert Guenther.

Of particular interest this summer was the unusual grouping of the nature program instructors with graduate students and post-doctoral personnel doing research at the Garden. Not only did one group gain an appreciation for the efforts of the other, but the *rapport* that became established among various individuals was, at times, positively electrifying. This had a stimulating effect on all that was being done and seemed to make the heat of the summer a lot more bearable.

We took advantage of the heat as best we could by informing the youngsters that the young scientists mentioned above had found that leaf temperatures became dangerously high during the severe heat spell. While

Experimental work is again carried on actively in the Experimental Greenhouse. Bruce MacBryde takes a light intensity reading near a small pine grown under experimental control.

PHOTO KENNETH PECK



there was not any precise equipment for the children to use in measuring temperatures, they were shown how to compare leaf temperatures in sun and shade by feeling the leaves with their fingers. From this a very instructive tale could be worked out about the cooling effect of vegetation. It was wonderful to see 25 youngsters all reaching for and feeling leaves at the same time.

The newest addition to the program was the making of sun dials on 4″ × 6″ cards. These were unique in that they could be re-set week by week to fit the changing angle of the sun.

New teachers in the program were Carol Koehler and Bill Eickmeier, both college freshmen this year. Returning instructors were Fred Bardenheier, Veronica Friel and Alan Meyers. The assistants this year were Kevin Friel, Dan Meyers, and Jay Soell. It goes without saying that all rendered their services excellently since the program ran very smoothly throughout the summer.

## RESEARCH

Most St. Louis citizens grow up with Shaw's Garden a household word, but few are aware of scientific research as a major program at the Garden since its creation 108 years ago. Actually, scientists all over the world are much more familiar with the role of the Garden in botanical research than are local visitors. Compared to 1964 and 1965, research activity at the Garden during 1966 has increased many fold. However, the present level is still not to the point it should be for an institution with such great collections. Growth is due in part to the low ebb reached a few years ago when the scientific staff was drastically depleted.

The scientists on the staff have all worked together effectively to get grants in support of their research programs. During the year the following grants were received:

| Title | Agency | Principal Investigator | Amount |
|---|---|---|---|
| "Flora of Panama" | NSF | Walter Lewis | $80,000 |
| "A Revision of the New World members of the genus *Chamaesyce*" | NSF | Derek Burch | 17,500 |
| "Botanical Studies in the Neotropics" | U. S. Air Force | Walter Lewis | 76,768 |
| "Pollen Morphology and Evolution in the Rubiales" | NSF | Walter Lewis | 24,700 |
| "Temperature and Light Relationships with Ecosystems" | ONR | David Gates | 3,600 |
| "Systematic Symposium" | NSF | Hugh Cutler | 1,700 |
| "Phylogeny of Alfalfa" | Pioneer Hybrid Corn Company | Edgar Anderson | 4,576 |

In addition to the above, Drs. Gates and Lewis are Senior Fellows in the *Center for the Biology of Natural Systems*, Washington University. Through a very large grant to the Center from the Public Health Service, they receive funds for much of their research at the Garden and for research assistants and research and post doctoral fellows.

In 1966 there were 7 full time senior staff, 6 research associates, 4 post doctoral fellows, 12 graduate students and 3 undergraduate assistants participating in the various research projects at the Garden. All of this work may be grouped in three major areas of research which are summarized below.

### Research Concerning Cultivated and Useful Plants

Dr. Hugh Cutler, Curator of Useful Plants, continued his research on the evolution of cultivated plants. His materials range from wild and weed plants related to cultivated plants, through fragments from archeological sites, to the many modern forms which have resulted from long association with man and domestication. Publication of studies done in previous years has encouraged botanists, geographers and anthropologists to collect extensively and to send their collections to the Garden to be identified. This work has been aided by a grant from the National Science Foundation.

The Garden has a long tradition of study of cultivated plants. Henry Shaw wrote articles on the history of grapes, roses, and plants mentioned in the Bible. Dr. George Engelmann grew many kinds of edible and ornamental plants and their wild relatives at the Garden and his herbarium specimens and notes are rare records of the kinds of plants grown in his time. The first Director of the Garden, Dr. Trelease, encouraged work on useful plants and as a result, especially of the work Dr. Irish did on wild and cultivated peppers, Dr. E. Lewis Sturtevant gave to the Garden his large library of early botanical works, extensive notes on cultivated plants, and many of his specimens. The Garden continues to be one of the most active centers for research on useful plants. So exceptional are our facilities that over 50 institutions have asked us to study some of their collections in the past few years.

Mr. Leonard Blake devoted two days each week to the study of plants sent in for identification by anthropologists. Much of this material has come from the work of universities and government agencies, such as the River Basin Survey of the Smithsonian Institution, which try to salvage as much as possible from areas to be destroyed by highway and dam construction. Mr. Blake has encouraged preservation of plant materials by demonstrating, to archeologists at meetings or at sites being excavated, the value of plants as records and the methods by which they can be recovered.

Dr. Edgar Anderson's research in this field is becoming more active again after several years of relative inactivity due to a series of severe illnesses. He decided that his most important job was to go through his collections of specimens, photographs, maps, field notes, precise measurements of pertinent plant populations and unpublished manuscripts. Some of these data concerned problems of more interest now than when they were collected. During 1966 Dr. Anderson turned most of this collection over to the Library, to the Herbarium, to colleagues and to fellow scientists elsewhere.

Using information gathered through years of study, he prepared a review article on experimental investigations of the species as a concept. All of the preliminary abstracting of the literature was completed.

### RESEARCH ON PHYSIOLOGICAL ECOLOGY

Under the general direction of Dr. David M. Gates, this relatively new program of research at the Garden grew rapidly during the year. Four graduate students were working with Dr. Gates and two visiting post-doctorals came to the Garden specifically for the opportunity to carry on research under his direction. The research is intended as a means to understand the direct influence of the environment on the plant through the flow of energy. A plant exchanges energy with its environment by means of radiation, cooling or heating by the flow of wind, and evaporative cooling by transpiration. For the first time the group was able to predict from theory whether an increase in wind would increase or decrease the loss of moisture from a plant. The prediction was confirmed by laboratory experiments. Last summer during the heat storm in St. Louis (during which period the temperature went above 104 F. for 6 consecutive days) the group worked with Dr. Gates measuring leaf temperatures, transpiration rates and water stress in leaves. Through these studies they could show that both the herbaceous ground cover and the tall trees had distinct advantages over the intermediate shrubs for surviving the rigors of the heat storm. This program of study in biophysical ecology is unique and students are being attracted to it from many parts of the country.

### SYSTEMATICS RESEARCH

Dr. Walter Lewis, in addition to teaching at Washington University, continued his studies in systematics of the *Convolvulaceae*, *Portulacaceae* and *Rubiaceae*, and was kept busy as a Senior Fellow at the Center for the Biology of Natural Systems. Dr. Lewis' field work consisted of a trip to the Appalachians in the spring and another to the Pacific Northwest in June. In December, Dr. Lewis, Dr. Dwyer, Dr. Burch, Mr. Oliver, Mr. Elias and Mr. Robertson spent 3 weeks in Panama on the Flora of Panama grant.

Dr. John D. Dwyer made four field trips to the Republic of Panama, taking a total of 12 weeks. Three of the trips were sponsored by the U. S. Army Tropic Test Center or by its civilian contractor, WEBCOR. The purpose of these trips was to collect flowering plants and ferns, to identify them and deposit sets at the Test Center and the Missouri Botanical Garden. About 3500 specimens were deposited in the Herbarium through the efforts of Dr. Dwyer on these 3 trips. The fourth trip was sponsored by the Missouri Botanical Garden for the Flora of Panama program.

Together with Dr. David Dunn of the University of Missouri, Dr. Dwyer initiated a Midwestern Colloquium on Biosystematics. The Colloquium is now a semi-annual affair with four land-grant Universities already requesting permission to serve as host institutions.

Through negotiations with Dr. James Duke, of the Batelle Institute under contract with the Altantic-Pacific Interoceanic Canal Survey, the

Missouri Botanical Garden received 1,390 plants for the herbarium which were collected by Dr. Duke in Panama and Puerto Rico. Almost 4,000 plants were identified by Dr. Dwyer and placed in the herbarium.

Dr. Derek Burch spent much of the year working the New World Collections of *Euphorbia.* The summer was spent visiting herbaria and botanical gardens in Europe and annotating material in the genus *Euphorbia* as part of the revision of the tribe *Euphorbieae* in the New World.

The botanical gardens he visited gave a broad spectrum of ways of keeping records, labeling, growing and displaying living collections, which should prove useful in the future development of the Missouri Botanical Garden.

Dr. André Robyns completed the following family revisions for the Flora of Panama: *Malvaceae, Vochysiaceae, Bixaceae, Violaceae, Turneraceae, Cochlospermaceae,* as well as identifying various collections from Panama.

Publications by the Staff were most significant and include the following during the year:

DEREK BURCH. The application of the Linnean names of some New World species of Euphorbia subgenus *Chamaesyce.* Rhodora 68:155–166, 1966.

———. Two new species of *Chamaesyce (Euphorbiaceae),* new combinations, and a key to the Caribbean members of the genus. Ann. Missouri Bot. Gard. 53:91–99, 1966.

———. The genus *Poinsettia (Euphorbiaceae)* in Florida. Ann. Missouri Bot. Gard. 53:375–376, 1966.

HUGH C. CUTLER. Corn, Cucurbits and Cotton from Glen Canyon. University of Utah Anthropological Papers 80:1–62, 1966.

———. Plants in a Mexican Market. Economic Botany 20:6–16, 1966.

———. Plant Remains From the Grand Village of the Natchez. Anthropological Papers, American Museum 51:1, 102.

———. Plant Remains from the Fanning Site, Kansas. Plains Anthropologist 11: 33, 210.

JOHN D. DWYER. New species of *Allomarkgrafia* and *Aspidosperma* (Apocynaceae). Ann. Missouri Bot. Gard. 53:104–105, 1966.

———. Notes on the *Lecythidaceae* of Panama. Ann. Missouri Bot. Gard. 52: 351–448, 1965.

———. Biology and Etymology. The Classical Journal 61:251–253, 1966.

———. A new species of *Platymiscium (Leguminosae)* from Panama. Ann. Missouri Bot. Gard. 53:105, 1966.

———. New species of *Coussarea, Machaonia, Psychotria (Rubiaceae)* from Panama. Ann. Missouri Bot. Gard. 53:105–109.

———. Three new species of *Neea (Nyctaginaceae)* from Panama. (With Sister M. Victoria Hayden) Phytologia, December, 1966.

———. *Dukea,* a new genus of the *Rubiaceae* (tribe *Mussaendeae*). Ann. Missouri Bot. Gard. 53:360–367, 1966.

———. Notes on *Coussarea (Rubiaceae),* especially the Panamanian species. (With Sister M. Victoria Hayden) Ann. Missouri Bot. Gard. 53:368–374, 1966.

DAVID M. GATES. Spectral Distribution of Solar Radiation at the Earth's Surface. Science 151: No. 3710, 523–529, 1966.

———. The Energy Environment in which we Live. Chapter in Book "Science in Progress" 15th Series, Yale Univ. Press, New Haven, London. Chap. 4, 92–124, 1966.

———, and R. F. Calfee. Calculated slant-path absorption and distribution of atmospheric water vapor. Applied Optics 5: No. 2, 287–292, 1966.

———, and R. Derby. The Temperature of Tree Trunks, calculated and observed. Amer. Jour. of Botany 53: 6, 580–587, 1966.

———, Idso, S. and Donald G. Baker. The Energy Environment of Plants. Advances in Agronomy 18 pp. 170–218, 1966.

———, and R. Janke. The Energy Environment of the Alpine Tundra. Oecologia Plantarum, Gauthier-Villars. 1:39–61, 1966.

———, H. G. Keegan and V. R. Weidner. Spectral Reflectance and Planetary Reconnaissance. Chapter in Book "Scientific Experiments for Manned Orbital Flight" Science and Technology Series, 4:71–86, 1966.

———, and Frank Kreith. The Micro-

Environment of Broad Leaf Plants—Convection, Radiation, and Transpiration. Proc. Inst. of Environmental Sciences, pp. 209–214, 1966.

———, and D. F. Parkhurst. Transpiration and resistance and Energy Budget of *Populus sargentii* leaves. Nature 210: 5032, 172–174, 1966.

Walter H. Lewis. The Asian genus *Neanotis* nomen novum *(Anotis)* and allied taxa in the Americas *(Rubiaceae)*. Ann. Missouri Bot. Gard. 53:32–46, 1966.

———. In: Chromosome numbers of phanerogams. 1. Ann. Missouri Bot. Gard. 53:100–103, 1966.

———. *Heydyotis nicobarensis* Lewis, nomen novum *(Rubiaceae)*. Ann. Missouri Bot. Gard. 53:109, 1966.

———. *Arcytophyllum laricifolium* (Cav.) Lewis, comb. nov. *(Rubiaceae)*. Ann. Missouri Bot. Gard. 53:110, 1966.

———. *Convolvulus rozynskii* (Standl.) Lewis & Oliver, comb. nov. *(Convolvulaceae)*. Ann. Missouri Bot. Gard. 53: 110, 1966.

———. Chromosome numbers of *Oldenlandia corymbosa (Rubiaceae)* from southeastern Asia. Ann. Missouri Bot. Gard. 53:257–258, 1966.

———. *Claytonia caroliniana* var. *spatulifolia* (Salisbury) Lewis, stat. nov. *(Portulacaceae)*. Ann. Missouri Bot. Gard. 53: 258–259, 1966.

———. Addendum: Schlecter's New Guinea duplicates of *Liparis* (Orchidaceae) at the Missouri Botanical Garden. Ann. Missouri Bot. Gard. 53:259–260, 1966.

———. Typification of *Hedyotis procumbens (Rubiaceae)* and a new variety from southeastern United States. Ann. Missouri Bot. Gard. 53:377–378, 1966.

André Robyns. Index to the "Contributions toward a Flora of Panama" and to the "Flora of Panama" through March 1965. Ann. Missouri Bot. Gard. 52:234–247, 1965.

———. Flora of Panama, Part VI, Family 115. *Malvaceae*. Ann. Missouri Bot. Gard. 52:497–578, 1965.

———. Two new species of *Gloeospermum (Violaceae)* from Panama. Ann. Missouri Bot. Gard. 53:110–112, 1966.

———. The publication date of the genus *Cochlospermum (Cochlospermaceae)*. Ann. Missouri Bot. Gard. 53:113, 1966.

———. *Pavonia (Peltaea) trinervis* (Presl) A. Robyns, comb. nov. (Malvaceae). Ann. Missouri Bot. Gard. 53:113–114, 1966.

———. *Hibiscus luteus* (Rolfe) L. O. Williams & A. Robyns, comb. nov. *(Malvaceae)*. Ann. Missouri Bot. Gard. 53: 114, 1966.

———. *Bernoullia* Oliv., a genus of *Bombacaceae* new to Panama. Ann. Missouri Bot. Gard. 53:112–113, 1966.

## Graduate Students and Post Doctorals

The illustrious history of the Garden for the training of botanists during the last 100 years is dramatic testimony to its contributions in this important task. The enormous increase in student enrollment this year over last is indication of the rapid recovery of the role of the Garden in the training of botanists. We can expect this increase to continue for several years until a new plateau is reached.

The graduate students and post doctorals now being trained at the Garden are listed below:

Graduate students sponsored by Dr. Dwyer:

Thomas Elias. Ph.D. candidate 1966–.
Research: Morphology of the inflorescence of New World *Rubiaceae*.

M. Victoria Hayden. Ph.D. candidate 1966–.
Research: Histology of seed coats of Rubiaceae.

Olga Herrara. M.S. candidate 1966–.
Research: Studies of the genus *Bixa*.

Graduate students sponsored by Dr. Gates:

Ronald Alderfer. Ph.D. candidate 1965–.
Research: Energy Budget Studies.

Bruce MacBryde. Ph.D. candidate 1966–.
Research: Energy Budget Studies.

Elwynn Taylor. Ph.D. candidate 1966–.
Research: Plant-water demand and $CO_2$ regime.

Graduate students sponsored by Dr. Lewis:

Ray F. Altevogt. Ph.D. candidate 1965–.

Research: Phylogenetic studies of alfalfa.

Daniel F. Austin. M.A. candidate 1966–.

Research: Monograph in Convolvulaceae (to be selected).

Joan W. Nowicke. Ph.D. candidate 1964–.

Research: Palynotaxonomic study of the *Phytolaccaceae*

Royce Oliver, Ph.D. candidate 1965–.

Research: Cytotaxonomy of *Claytonia.*

Kenneth R. Robertson, Ph.D. candi- 1966–.

Research: Monograph of *Jacquemontia* (Convolvulaceae).

Post doctoral persons performing research at the Garden during 1966:

Dr. Robert L. Jefferies. Ph.D., University of Bristol, England, 1962. Post doctoral, Center for the Biology of Natural Systems.

Research in ion transport in plants.

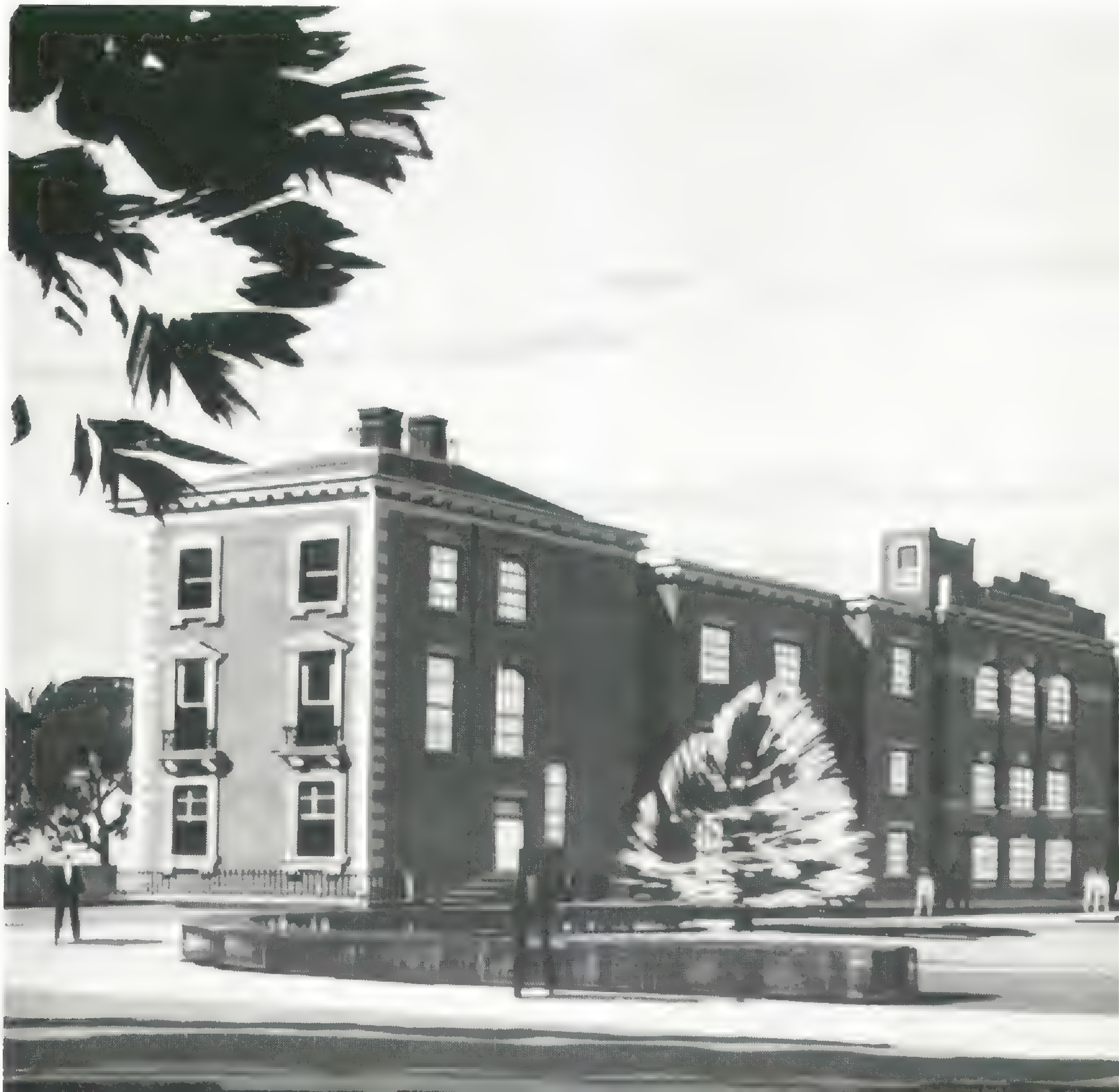
Research in water relations and energy budget of plant leaves during summer 1966 with Dr. Gates.

Dr. Bernard Mikula, Ph.D., Washington University.

Visiting Senior Fellow, Center for the Biology of Natural Systems.

Research on Corn 1966-67.

## ARCHITECTS' DRAWING OF TH



Dr. Warren Porter. Ph.D., University of California, Los Angeles, 1966. Post doctoral, Center for the Biology of Natural Systems.

Research: Energy Budget of Animals 1966-67.
Sponsored by Dr. Gates.

### SYSTEMATICS SYMPOSIUM

Dr. Cutler was in charge of the 13th Annual Systematics Symposium, on the subject "Systematics and Natural Areas." This was again supported by the National Science Foundation. Registration has been limited to 180 botanists and zoologists because meeting space is limited and because interchange of ideas is more active when participants can see and hear each other clearly. Two months before the meeting all spaces had been reserved. Many participants remained after the meeting to study collections in our library and herbarium, consult with our staff, or visit the Arboretum. The subject of the Symposium to be held next October 13–14 will be "Systematics of Animals and Plants Associated with Man."

## SED NEW LIBRARY-HERBARIUM

COURTESY MURPHY & MACKEY

## HERBARIUM

The strength of the Missouri Botanical Garden as a world center for plant systematic research, results primarily from its great herbarium and the close proximity of this huge collection of plants to an equally great botanical library.

As of December 31, 1966, the accession number was 1,834,853 with 26,518 new specimens added since the last report in 1965. The Director of the herbarium, Dr. Walter H. Lewis, estimates that perhaps 7–15% of the specimens stored in the herbarium do not have an accession number stamped upon them, raising the possibility that our collection is many thousands larger.

Additions in 1966 were largely from exchanges, gifts and the collections of staff members. Specimens were chiefly from North, Central and South America, Mexico, Europe and tropical Africa. Gifts totaled 2,686 specimens, 500 specimens were purchased through the Mrs. H. M. Richards herbarium from tropical Africa, 9,195 specimens were received through exchanges with other institutions and the remainder were collected by staff.

At the end of this year approximately 29,364 specimens were on loan for research purposes to various institutions throughout the world while the Garden received 4,754 specimens through loans for our research staff.

Miss Melanie Brown brought the *Gray Index* card file up to date as well as the Index *Nominum Genericorum*; a total of approximately 8,600 cards were filed.

Mr. Claude Johnston began the huge job of printing negatives of African "Type" photos in July and to date 1300 8″ × 10″ prints have been made for exchange distribution. A notice regarding availability of these enlargements appeared in *Taxon* and the response was overwhelming.

Miss Susan Verhoek, M.A. Indiana University, assumed the new position of Senior Herbarium Assistant in September. Susan is immediately responsible for all the curatorial activities in the Herbarium.

Much time was taken in 1966 preparing plans for the new Library-Herbarium building. After several months consultation with architects, Murphy and Mackey, Drs. Lewis and Van Schaack collaborated on preliminary floor plans for herbarium and library space in the new building. Dr. Lewis traveled to major herbaria in Colorado and California to acquire ideas for the new Herbarium and Library Building.

Mrs. William Panos, Herbarium Secretary, smoothly coordinated the many herbarium activities and acted as information center for the many students and staff and visiting scientists using the herbarium.

PHOTO C. JOHNSTON

Susan Verhoek, Senior Herbarium Assistant, working with the backlog of uncurated collections in the Herbarium.

## LIBRARY

Dr. George Van Schaack, Librarian, prepared the following report:

As part of the general upswing in Garden activity, scientific use of the library rose markedly during the year. On the one hand there was increased direct circulation to staff members and their students, both ranks having recently been considerably enlarged, and on the other, interlibrary loans to students, of Washington University especially, took a definite upturn. All of this reflects renewed study of the subjects so remarkably well covered by our collection—taxonomy, plant geography, ecology and horticulture.

In addition to the gifts mentioned on page one, others have been forthcoming in amounts up to $1000 for the preservation and curation of this important segment of the library. There also has been a larger number than usual of gifts in kind, namely books themselves. These have included a fine copy of Dykes' Monograph on Iris, a complete set of our own *Annual Report* (1890–1912), and an old 19th century *Atlas of Missouri* (1873) containing a paper on the meteorology of the state by Dr. George Engelmann, with a copy of his climatological map of that date.

In mid-April Miss Shirley Althoff

and Mr. Richard Weddle of the *St. Louis Globe-Democrat* spent a whole day at the library with notebook and camera collecting material to show the condition of the library generally and of the more valuable books in particular. Their most excellently written account and fine photographs occupied the cover and four inner pages of the June 12 edition of the *Globe's* magazine section, with two pages in full color. This very major gift of publicity has greatly stimulated interest in the Garden's library and, as well, in the Garden as a whole, and the administration takes pleasure in this opportunity to express its deep appreciation.

The visitors' book has been signed about twice as often as in the preceding year. We try to get everyone to leave his signature, but of course a few 'get away.' Guests from a distance have signed in from Alaska, Norwich (England), London, Munich, Paris, Sweden, the Botanical Gardens in Brisbane, the University of Madrid, and the Main Botanical Gardens in Moscow. Much as we are interested in the visitors from abroad, we should be glad to see many more from the Midwest—in fact, we should like to be as well-known as a library of world importance by our neighbors as by the distant visitor.

Operations in the library presented little of novelty for the year except that lack of sufficient personnel for carrying on a full program finally resulted in no binding being sent out for the first time in many years. Somehow this important lack must be at least partially made up in the year ahead. Acquisitions were at an all-time high, entirely absorbing the funds not spent on binding. Just where all the books offered in the dozens of sale catalogues which arrived during the year came from is something of a mystery, for in general there is no doubt that the secondhand book market in science is drying up. Assiduous reading of these many catalogues enabled us to purchase a large number of important, mostly 19th century, items to fill in gaps in our monographic, plant distribution and journal collections. Prices were often higher than in the past; however, these scarcely proved a match for the greatly increased prices of new publications, which in some instances were so large as to raise the question whether publishers were not carrying on a raid against the generally increased library budgets now to be found in the United States. Processing acquisitions and keeping the records of incoming serials, received both on order and by exchange, is entirely taken care of by Mrs. Carla Lange, Library Assistant. Despite her valiant efforts to keep ahead, this work now occupies almost all of her time, testimony to the markedly increased flow of new materials into the library.

The program of book repair on the premises continued throughout the year at varied pace as help became available. In addition to our regular weekend helper we had a Stanford student for eight weeks during the summer, and since about November 1st Mr. William Panos has been spending half-time downstairs re-covering books and doing other standard repair jobs. We hope this program may eventually develop until there are two full-time binders—even these, however, would not be able to deal with the very extensive rehabilitation job which faces us before the collection can be said to be in good shape.

In mid-September Dr. Frank Pershe resigned his position as assistant librarian to go to the new campus of the University of Missouri at Normandy. Earlier in the year Mrs. Richard Gruendler took a position as half-time secretary and general assistant, thus returning to employment here after a gap of several years. Among several important housekeeping jobs which she accomplished is the curation of the so-called Engelmann letters, a collection of some four thousand letters received by Dr. George Engelmann from 1835 to his death in 1884. This important collection had been hinged (with court plaster!) into some twenty-five blank books of wood pulp paper pages recently beginning to disintegrate. The letters were removed and unfolded, each being placed in its own acid-free paper folder on which the writer's name, with address and date of writing, was typed. Several hundred letters, never mounted, remain to be sorted and similarly filed.

A rather large segment of the librarian's time was taken up with planning space in a new building hopefully to be built within the next three years. With a preliminary layout in hand he made a trip in March to several natural history libraries in the East, and later to the University of Kansas, to the Linda Hall Library in Kansas City, and to our own Washington University School of Medicine. No one consulted said, 'Oh, but you've planned too much space there!'; however, several librarians insisted that certain space requirements had been underestimated—space, of course, costs money, and it is always easier to urge someone else to spend extra on his new building than to find enough funds in one's own budget for doing so. We must try to avoid underestimating, but at all costs we must plan so that additional space can later be built without again disturbing the collection—moving books is not cheap in itself, but the almost unavoidable damage to older books can be very costly.

A fairly accurate census shows that our collection would occupy some 8200 linear feet of shelving, better than a mile and a half of books set side by side. Our new quarters ought to have at least twice as much room, including some special oversize shelving for our many folio volumes which should lie horizontally. Our present 7600 feet of shelving is better than 95 percent full. Where are the unshelved books? Well, those not just 'stacked' here and there are in several hundred sealed boxes in 'dead storage' where they must remain essentially unconsultable until a new building is provided. It is estimated that until then the number of storage boxes must increase yearly by some two dozen or more.

Estimating ten books per foot of shelving gives the staff the equivalent of something over 80,000 volumes to care for. It is only our regrettable (although currently fortunate) lack of more intensive use which makes it possible for the present staff of two full-time and two half-time members and a

Saturday helper, to keep the collection in order enough to be used as needed. The staff is woefully too small to undertake all the backlog of proper recataloguing and reclassification and that of binding and repair which must be done before the more intensive use this collection deserves could be serviced at all. A collection of this size cannot flourish on a fixed endowment as small as at present provided; this endowment basis must be doubled or tripled to protect the future of the collection which, though not the largest of its type in the country, still can yield as many or more references per unit of time and unit of walking distance as any to be found under a single roof in the Western Hemisphere.

## PUBLICATIONS

BULLETIN: As he has been since 1963, Dr. Edgar Anderson was Editor of the BULLETIN in 1966. The usual 10 numbers were published, of which several were fine examples of what the Garden can do when various staff members cooperate effectively in producing 1) ideas; 2) articles; 3) timely, interesting and beautiful photographs; 4) proper editing; 5) good secretarial service.

The general aim of the BULLETIN is to present: a) information about the Garden, its people and its activities; b) horticultural information of general interest to gardeners in this region; and c) botanical information for the interested layman. Dr. Anderson has done an excellent job as Editor, presenting hundreds of pages of information written interestingly in his inimitable style. However, the Garden as a whole has not been contributing enough material to ease this burden of Dr. Anderson's and must do so increasingly in the future.

The September issue produced a most enthusiastic response from the Garden's staff, from former students, and from those citizens and societies who have particular interests in the Garden and its concerns.

Lad Cutak wrote an entire issue on *Sansevierias* for the June BULLETIN which is proving popular with the public as an over-the-counter purchase.

The timely horticultural advice prepared for seven BULLETIN issues by Mrs. Eleanor McClure is of more than passing interest. The best times to plant and prune, what and when to water and how much, the comparative hardiness of varieties as learned over more than one decade—all such understandings as these grow out of group experience. St. Louis is the center of a considerable area in which this information has never before been carefully harvested. Mrs. McClure's own experience in her own gardens, her detailed understanding of other peoples' garden problems from her career as a landscape gardener, her association with the Federated Garden Clubs, her friendships with other horticultural writers and editors, make her contributions to the BULLETIN of lasting importance for this area. Her precise directions about peonies, for instance, on pages two and three in the October BULLE-

TIN are more helpful in a St. Louis garden than whole books written by peony experts along the East Coast or in England.

### ANNALS

Communication of the results of systematic studies of plants by Garden Staff is accomplished primarily through publication of the scientific journal, the *Annals of the Missouri Botanical Garden.* This journal is the most important method by which the scientific community throughout the world learns of our scientific program and its progress in plant systematics. The *Annals*, now in its 53rd year of publication, has been in an active phase of rebuilding since 1965, after very little publishing activity the previous two years. Subscribers, noting the drastic reduction in size of the volumes in 1963 and 1964 were alarmed and some canceled their subscriptions. Dr. Lewis, Editor, and his Editorial Committee comprised of Dr. Derek Burch, Dr. John Dwyer, Dr. André Robyns and Dr. George Van Schaack have strongly reversed this trend with two very complete, scientifically strong, volumes in the past two years. Subscriptions and receipts for 1965-66 are up 25% over 1964-65 and should increase much more substantially when the results of a worldwide campaign for new subscribers are known. Our staff developed a fine little promotional brochure about the *Annals* in 1966. This was sent to 3000 potentially interested individuals, institutions and libraries from our offices. Our official *Annals* Agent, Stechert-Hafner Service Agency, Inc., New York., is now mailing 13,000 more to locations around the world.

In addition to income received from subscriptions and miscellaneous sales, the *Annals*, through exchange with 336 institutions, provides our Library with a like number of subscriptions to other journals. The return received by our Library through this exchange and a similar exchange through the *Bulletin* is estimated conservatively at $3,500–$4,000 annually.

## PUBLIC RELATIONS

PUBLIC Relations, formerly carried on by interested staff on an uncoordinated basis or assigned to professional firms, has now been turned over to Garden staff. Ladislaus Cutak, Manager of Public Relations, and Leslie Gleason, Publicist, can communicate directly with the various media and get better results. The local newspapers and neighborhood weeklies have carried many news items about the various activities at the Garden while trade journals have also limelighted our institution throughout the year. For example, the *Dodge News* in their August number used several color photographs of the Climatron and plants grown within, accompanied by a page of text. The October 21 edition of *Senior Science* had an article by E. C. Gottschalk on "Tropical" Missouri telling all about the halfacre of tropic "jungle" under our geodesic dome. The March *Orchid Digest* included an illustrated article on "A Visit to the Missouri Botanical Garden" by Lad

Cutak, highlighting the orchid collection, the Climatron and several other programs.

Radio and Television stations in the St. Louis area have also given the Garden added publicity relating to special shows in the Floral Display House, school programs and nature studies for children, cultural hints for gardeners, information about new orchids developed, etc. Sometimes these were just brief announcements by newscasters but frequently live discussions also took place in the studio, in the Garden, or elsewhere on the spot.

Several outstanding exhibits were staged in windows and lobbies of local banks to attract and focus attention on the Garden. Beginning February 28 and continuing for two weeks, the Mercantile Trust featured an unusual display of orchids in the 8th Street Lobby. Marjorie Longo, editor and photographer of the *Mercantile News*, brought her models and photographed them in our orchid ranges for the express purpose of illustrating a story on orchids in the February issue of the Bank's monthly. In November a second display was placed in the Mercantile Trust by the Garden, this time featuring Tower Grove House with some of the Henry Shaw memorabilia like personal ledgers, favorite books, walking canes, dishes, furniture and medicinal chest with original bottles of ipecac, laudanum and epsom salts. Potted chrysanthemums added spots of color to the exhibit. A story with pictures on the Shaw Mansion was used in the November issue of *Mercantile News* distributed to the Bank's patrons and employees. This exhibit also lasted two weeks.

In the first two weeks of November the First National Bank carried a scientific exhibit in its Locust Street Lobby. Many local people and the general public are unaware of the highly important scientific work that has distinguished the 110-year history of the Garden and so the exhibit presented material emphasizing the scientific endeavors of its staff. This exhibit contained historic plant specimens from our Herbarium, colorful examples of scientifically important books from our Library, centuries-old plant material discovered by archeologists and studied at the Garden and examples of books and scientific articles published by the Garden or written by Garden Scientists.

The St. Louis County National Bank in Clayton sponsored an Orchid Show in October in which growers from various parts of the country were invited to exhibit their wares. The Garden participated in this big Show and set up a stunning display of botanical and flamboyant orchids under the direction of Marion Pfeiffer, Alvaro Marmol and Lad Cutak. Visitors congregated in droves around the exhibit because the Garden has a reputation for possessing many unusual orchids, along with highly colored hybrids.

During December a spectacular Christmas display of lighted trees was put up in the main garden. Eight large evergreens were anchored in the large central pool and one tree was placed atop the Climatron entrance. The tall Juniper hedges on either side of the Climatron doors were also strung with lights. When the Climatron was lighted and the trees aglow with varicolored electric bulbs, the whole presented a dazzling scene appropriate for the Christmas season. Reflections in the water were superb. Art Witman of the *St. Louis Post-Dispatch* photographed the scene and it was used on the cover of *Pictures* magazine on December 25. The following day was one of the largest days in attendance ever known for a December, proving that proper publicity has great impact on attendance, even in winter.

Many of the Staff gave talks and lectures throughout the St. Louis area and the nation. Those especially active in this type of Public Relations activity were Dr. Gates, Mr. Cutak, Dr. Burch, Dr. Anderson, Mr. Kohl, Dr. Van Schaack and Dr. Lewis.

Mr. George H. Pring, Superintendent Emeritus, continued dispensing his own unique brand of accurate, useful horticultural information each morning via telephone. Mr. Pring also appeared on a weekly radio program in the spring discussing gardening with other local experts.

Some of the staff spend considerable time identifying flowers, trees and cultivated plants and weeds from specimens brought to the Garden, mailed in, or just described over the phone. This type of service is carried on by our scientific and horticultural staff purely as an "extra" undertaking which occupies a rather substantial part of their already full schedule.

Much time has been devoted to individuals, firms, schools and organizations who seek information and request photos about the Garden. Some of this material will eventually appear in "house organs," books, magazines and encyclopedias that have to prepare material much in advance. The Garden has to be alert to every possibility and avenue of approach to keep the public informed what this institution is doing, will do or contemplates doing in the future.

The expert photographic talents of Mr. Claude Johnston are now being used to furnish a continuing flow of good photographs of Garden activities, events and facilities. Claude, as a former professional photographer and a long-time Garden employee, provides us with just the right combination for these needs.

## MAINTENANCE AND ENGINEERING

UNDER the efficient supervision of Jim Hampton and his new assistant engineer, Jack Pavia, who started work in early summer, the Department of Maintenance and Engineering continued making wonderful progress during the year. Many major maintenance and rehabilitation projects were accomplished as well as many lesser but often long-delayed jobs. Such "extra" jobs were done in addition to the routine work which, of course, takes up the bulk of the maintenance and engineering staff time throughout the year.

Some of the big improvements were: painting of the Museum Building exterior, interiors of the Floral Display House, Linnaean House, Desert Houses, Experimental Greenhouse and new

Head House, women's restroom at main gate and the basement of the Museum. Two greenhouses were completely rebuilt, a new sprinkler system was placed in the Linnaean Garden and air conditioning was installed in the new Park Building Offices. Much effort went into installation of a new, fully automatic boiler and associated heating system renovation and conversion of existing boilers to automatic control. When charging began at the Main Gate, we first had to set up a booth for the attendant and new turnstiles and posts for chains to guide the visitors to the attendant's booth. In the past year we have been replacing old glass on a few of the greenhouse roofs with plastic. In 1966 the roofs of the Amateur Display House and the upper portion of the north end of the Floral Display House were converted to a light green plastic. First impressions have been favorable, but further tests and time will tell the final story.

The general impression one now receives when visiting the Garden is that we "care" about our facilities. Often a fresh coat of paint is all that is needed to make an institution appear lively. We will continue our campaign to spruce up the Garden until it is in as fine condition as possible.

## WOMEN'S EXECUTIVE BOARD OF THE FRIENDS OF THE GARDEN

The Women's Executive Board, under the leadership of Mrs. Edward L. Bakewell, Jr., until May, and since then of Mrs. James G. Alfring, had a fine year in 1966. There are three principal responsibilities under the direction of this group of volunteers: the Friends of the Garden, the Tower Grove House and the Garden Gate Shop.

### Friends of the Garden

The membership office of the Friends of the Garden is on the first floor of the Administration Building. Mrs. Leslie Gleason, Executive Secretary, manages this office and supervises volunteers and all the hundreds of details relating to membership, contributions, mailings, renewals and publicity. The social activities of the Friends, including the Flower Show Preview Parties, are arranged and coordinated through this office.

Membership in the Friends of the Garden has remained around 2900 strong through the year. Had it not been for an active membership drive in October, it would have been lower.

The average contribution to the Garden through the Friends has increased slightly during 1966 bringing the total contributions up higher than they have been in the history of the Friends' organization.

The recently inaugurated Memorial Contribution Program is being increasingly adopted as a method for perpetuating the memory of a friend or relative through a contribution to the Garden. In 1966 almost 100 contributions were made to the Garden in this way.

### Tower Grove House

The Historical Committee of the Women's Executive Board supervised the operations of Tower Grove House, the 118 year old country home of Henry Shaw. St. Louis has become very conscious of its historical heritage recently, and the Garden with its vast wealth of beautiful architecturally significant structures has achieved its share of interest. About 27,000 people were given guided tours through Tower Grove by the hostess-guides during 1966. Miss Nell Rives is Manager of Tower Grove and she is assisted by one regular hostess each day of the week. In addition, there are throughout the year many volunteer hostess-guides who donate their services.

There were several special events at Tower Grove House during the year: The Veiled Prophet's Queen of Love and Beauty gave a reception for the children of St. Louis and surrounding areas on October 8. Hundreds of youngsters, and their parents, attended even though rain threatened most of the day. Again at Christmastime, the House was decorated in a beautiful Victorian style attracting many delighted visitors.

After the torrid summer, it was decided that Tower Grove House requires air-conditioning for the comfort of the visitors and hostesses. Plans were formulated in late 1966 for an air-conditioning system which will not detract in the least from the appearance of this historical structure and installation is now in progress.

All of the outside woodwork was painted in 1966 and much painting and redecorating was accomplished in the interior to keep the house in top condition.

The Historical Committee, responsible for the management of Tower Grove House is: Mrs. Edwin R. Culver, Mrs. Neal Wood, Mrs. John S. Lehmann and Mrs. Jerome F. Kircher.

Children and their families waiting in line at Tower Grove House to greet the Veiled Prophet's Queen, in spite of a light drizzle of rain. This is a long-time special event at the Garden arranged and managed through the "Friends of the Garden."

PHOTO COURTESY GLOBE-DEMOCRAT

### GARDEN GATE SHOP

Under the direction of Mrs. William M. Robinson, Shop Chairman, with Mrs. Edwin F. Steussie as Manager and a Shop Committee comprised of Mrs. Fred W. Wenzel, Mrs. Charles A. Brandon, Mrs. John L. Christian and Mrs. Edward L. Bakewell, Jr., the shop innovated several new projects during the year. The first was a buying trip to the National Gift Show in Chicago as part of the continuing search for original and unusual items for the Shop. Later the Shop held special sales and displays at the Chrysanthemum and Poinsettia Show Preview Parties with fine results.

For the first time the volunteer personnel requirements of the Shop were taken over by Mrs. Fristoe Mullins and Mrs. John Curby as a Women's Executive Board activity. All Board members are working at the Shop. With greatly increased growth of sales, a new personnel arrangement will go into effect early in the New Year. Mrs. Howard Yerges will be Chairman with five sub-Chairmen responsible to her.

## FINANCES

THE Garden completed the 1965-66 fiscal year ending on June 30, 1966, with a small surplus of $4,519.00 after receipts and expenditures of $449,272. The surplus was not the result of too sufficient income, but rather very careful spending and management, unfilled but budgeted positions, an easy year for fuel costs and, most important, an unforeseen increase in income. Therefore, in spite of a year with the budget in the black, the Garden continued to have its, by now, fairly routine problems: low wages, shortage of staff and lack of funds for major maintenance work, modern time-saving equipment, and new buildings

Endowment income for the Garden continues to decrease relative to income from other sources. Only a few years ago, endowment income provided at least 75% of the total. For the current year, at least one-half of the operating income must be found from outside contributions.

An approximate summary of the situation for the current year is given below:

| | |
|---|---|
| TOTAL OPERATING COST | $537,000 |
| OPERATING INCOME: | |
| Henry Shaw Estate (Endowment) | $256,500 |
| Arts and Education Council | 76,000 |
| Friends of the Garden | 50,000 |
| Admissions Receipts | 70,000 |
| Private Donations and Other | 62,500 |
| | $515,000 |
| Potential Deficit | *$ 22,000* |

With a continued increase in activity at the Garden, the volume of expenditures and receipts increases also. The Business Office is hampered by lack of good working space, storage space and up-to-date equipment. Mr. Waldo Fechner, Controller and Business Manager, and his assistant and secretary, Mrs. Max Pfeiffer, nicely manage to carry on the necessary functions of the Business Office under much less than ideal office conditions.

## BOARD OF TRUSTEES

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## FRIENDS OF THE GARDEN

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Edgar Anderson, Botanist
Clarence Barbre, Instructor
Clifford Benson, Plant Breeder
Derek G. Burch, Chief Horticulturist
Ladislaus Cutak, Horticulturist and Manager of Public Relations.
Hugh C. Cutler, Curator of Useful Plants
John D. Dwyer, Research Associate
Waldo G. Fechner, Secretary of Board and Controller
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F. R. McMath, Rosarian
Viktor Muehlenbach, Research Associate
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George B. Van Schaack, Librarian
Susan Verhoek, Senior Herbarium Assistant

The Missouri Botanical Garden is a member of the Arts and Education Fund, Greater St. Louis.

# WHY SHAW'S GARDEN NEEDS YOUR HELP

The Missouri Botanical Garden is privately supported. It receives no City or State tax-money. It is heavily dependent upon individual contributions and donations by individuals, Garden Clubs and other Organizations for operating income. It is the only large botanical garden without direct tax support.

The Missouri Botanical Garden is a major force throughout the world in plant science, horticulture, and gardening. The original endowment by Henry Shaw permitted the Garden an illustrious beginning and spectacular success in the early development of its library, herbarium (collections of pressed plants), research programs, and many fabulous introductions, including world-renowned orchids and tropical water lilies. Rapidly rising costs forced the Garden to reduce staff to bare minimum maintenance and to discontinue many excellent programs. For many years buildings, grounds, fences, walks, roads and other facilities deteriorated for lack of money. The trend is strongly reversed, but the future is not secure as yet.

The Garden's great collections are of rapidly increasing world importance. Like a masterpiece of art or a fine manuscript of music, an extinct plant is lost forever—worse yet, knowledge of whole plant communities will be denied to future generations. The face of the earth is changing rapidly under the impact of Man. These great collections are the only precise record of the evolution of plants prior to their eradication from many regions of the globe. Mankind is completely dependent upon plants for food, for cleansing the air, for retarding erosion, for the beauty about us and for the development of recreational areas for a people with increasing leisure time. We cannot live in health and happiness without understanding the natural world, so generously given to mankind as part of his evolutionary heritage.

Please give us your generous support. Until a major improvement in endowment income is achieved it is urgent that annual contributions be sufficient to permit us to operate adequately.

You can help us by becoming a Friend of the Garden for $15.00 per year. You can help more by becoming a Participating Member for $25.00, a Contributing Member for $50.00, a Sustaining Member for $100 per year, or by taking a Life Membership for $1,000. By elevating your membership you will help us at a critical period in our history. Or if you can, make a substantial gift. By doing so you will help the St. Louis community and mankind everywhere by helping the Garden.

# MISSOURI BOTANICAL GARDEN

# Bulletin

March 1967
Volume LV
Number 3

NEW ENGLAND FERNS FOR MISSOURI GARDENS

SPRING PLANTING ADVICE

COVER: A massive colony of Royal Ferns on the bank of a Connecticut stream.

THE article on the cinnamon ferns, and the photographs which accompany it were contributed by our longtime colleague at Washington University and the Garden, Dr. Henry N. Andrews, Jr., now of the Biology Department at the University of Connecticut. A world recognized authority on fossil plants, one of his chief interests during the last decade has been the evolution of these ferns. Among other things he grew them in his garden in Webster Groves, discovering that they are still vigorous and adaptable, a boon to Missourians with shady gardens as well as to homesick New Englanders.

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Missouri Botanical Garden Bulletin

Vol. LV No. 3 March 1967

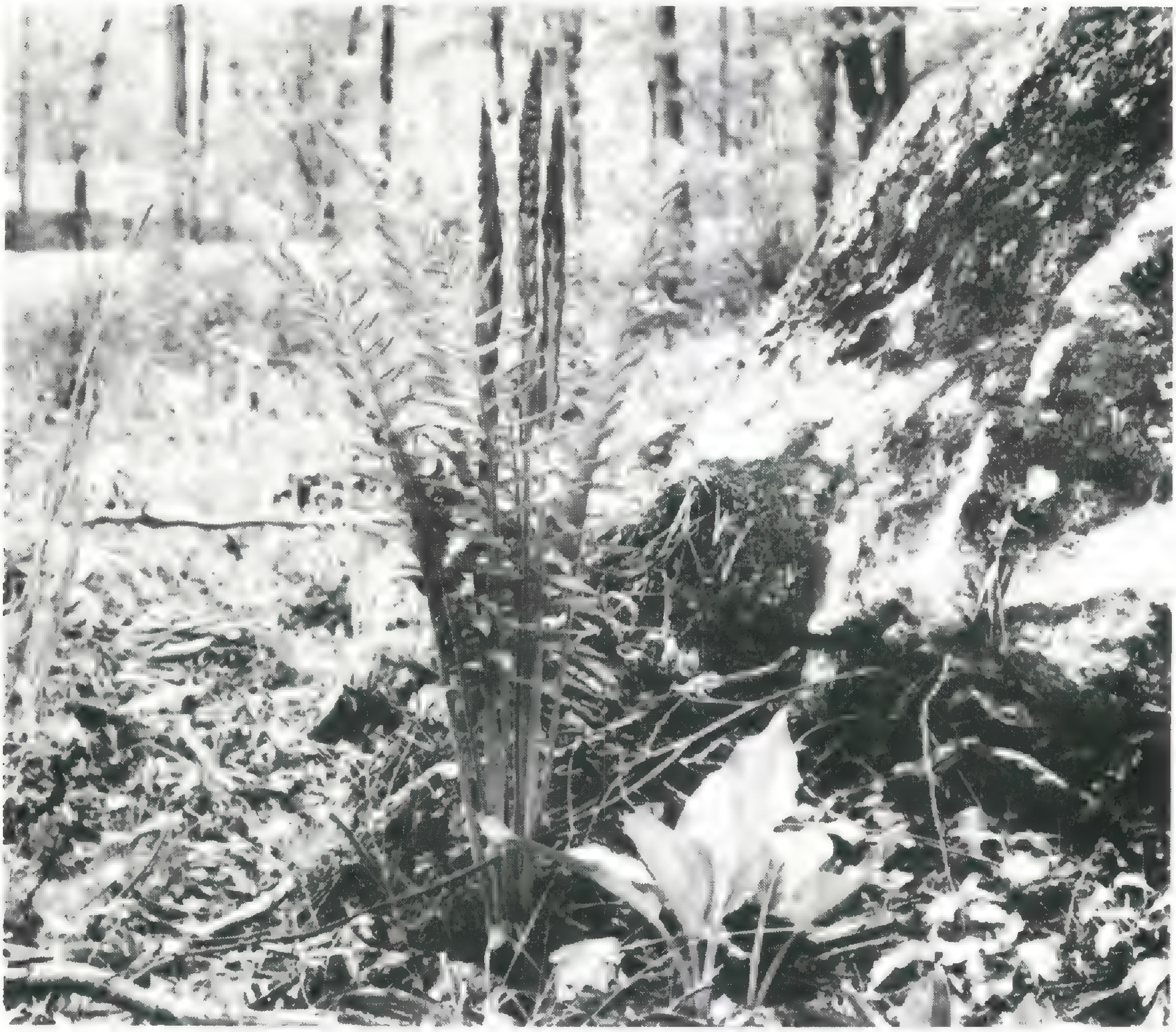
# THE CINNAMON FERNS — FOR MISSOURI GARDENS

HENRY N. ANDREWS

For the discerning plant lover on his first visit to New England the lush growth of ferns so frequently encountered along the roadsides comes as a pleasant surprise. There are two easily identified species in particular abundance: the Cinnamon fern *(Osmunda cinnamomea)* and the Interrupted fern *(Osmunda claytoniana)*. They are not very common as native plants in Missouri but they do occur here and they can be grown in your garden. It is my purpose here to tell a little of the history of the the Osmundas and to encourage Missouri gardeners to enrich their collections with them. They are among the most handsome and vigorous of ferns with a genealogy that has been traced back about 180 million years; they are, in fact, one of the oldest of the living things with us today. They deserve a larger niche in Missouri horticulture.

First, to get acquainted with the more common members of Osmunda—in the eastern United States, extending into Missouri, there are three species, the Cinnamon and Interrupted ferns mentioned above and a third one, the Royal fern *(Osmunda regalis)*. In certain important features, such as the structure of their spore sacs and in their anatomy, they are strikingly alike and there is no question about their close relationships; botanists do a good deal of arguing about the classification of many ferns but there is little difference of opinion in the case of the Osmundas. Let's look first at the Cinnamon fern; in the spring there emerges from the tip of the stout rhizome a terminal cluster of a dozen or so leaves which are of two distinctly different kinds. Some are perfectly normal, green, twice divided leaves (twice pinnate in botanical terms) and they carry on food manufacturing for the plant. Others are of essentially the same construction but they are rusty brown in color and bear thousands of spore sacs, each about a 50th of an inch in diameter. These fertile leaves add a distinctive and showy touch to a garden in mid spring; they tend to wither after the spores are shed. The Interrupted fern is quite similar; I know of no way by which its ordinary leaves can be readily distinguished from those of the Cinnamon fern; however, some of the leaves of the Interrupted fern have not only green leaflets but others that consist of dense clusters of spore sacs; thus the leaf is "interrupted" by the development of its fertile parts and the name is appropriate.

The Cinnamon and Interrupted ferns present one of those rare instances in



*Osmunda cinnamomea.* A plant in early spring showing three of the fertile leaves. About half a dozen green leaves surround it like a vase. As they develop into feathery plumes they will dominate the scene for the rest of the season.

which man's devastation of nature has encouraged plants of exquisite beauty. They are versatile ferns, being found in dense shaded woods, but it is in open places where they develop most luxuriantly. Not all ferns seek the shade; some like the sun and the Osmundas are among them. Thus it is along the roadsides of New England where man has opened up the forests and let in more sun that they flourish with a zest possibly unequaled in their entire history. This habitat suits them to perfection and it is man-made. This should be remembered when setting plants out in your garden; pick a spot where the sun comes in for about half the day.

Next, let's look at the third member of the group, the Royal fern *(Osmunda regalis)*. It too is occasionally found along New England roadsides and I could take you to places where all three grow within a few feet of each other. But, by choice, the Royal fern prefers a more moist location; it is happier and more luxuriant in swamps and along the banks of streams where it often forms a massive colony. The leaves are generally taller than those of the other two Osmundas and they are distinguished by a tassel-like crown of spore sacs at the tip.

Although these three ferns are not common they do grow naturally in Missouri. I have taken many students on field trips to a spot south of Farmington where sandstone and granite outcrop and in moist places among the pines we find all three along with some other Appalachian plants that are "stranded" here in Missouri, such as Azaleas and Sphagnum moss.

My own experience in growing the Osmundas is not extensive but it is encouraging. About five years ago I introduced into my garden in Webster Groves some plants of the Cinnamon and Royal ferns. The stout rugged rhizomes, encased in a dense mantle of roots, were dug in New Hampshire in early September and planted in my Missouri garden in a mixture of approximately two parts of peat to one part sand. A few weeks ago the present occupant kindly sent me a few leaf specimens and informed me that the plants are thriving. I recall seeing some fine plants of Cinnamon fern in the St. Louis garden of my colleague at Washington University, Professor Thomas Hall, and he has kindly contributed his experience with them, as follows: "These are growing in a fairly airy but rather fully-shaded area with not more than two hours maximum of full sun. . . . The shade is provided entirely by evergreens, namely Ilex of various species, evergreen magnolias and white pine. . . . The soil in this area was originally good Missouri gumbo but it was prepared for planting by a lavish intermixture of perlite which has stood up for years without disintegrating in the soil and gives it a very light, foamy quality. Other plants very successfully established in the area include the wild ginger (Asarum), Bellwort (Uvularia), Maidenhair fern, and the foam flower (Tiarella)."

Last spring I shipped a few plants to a friend in Urbana, Illinois, and they are flourishing. So abundant are the Osmundas in many places that one may dig a few without worrying about depleting the supply. Thus with modest expenditure for the preparation of the soil these luxuriant ferns may be expected to add a special touch to a Missouri garden.

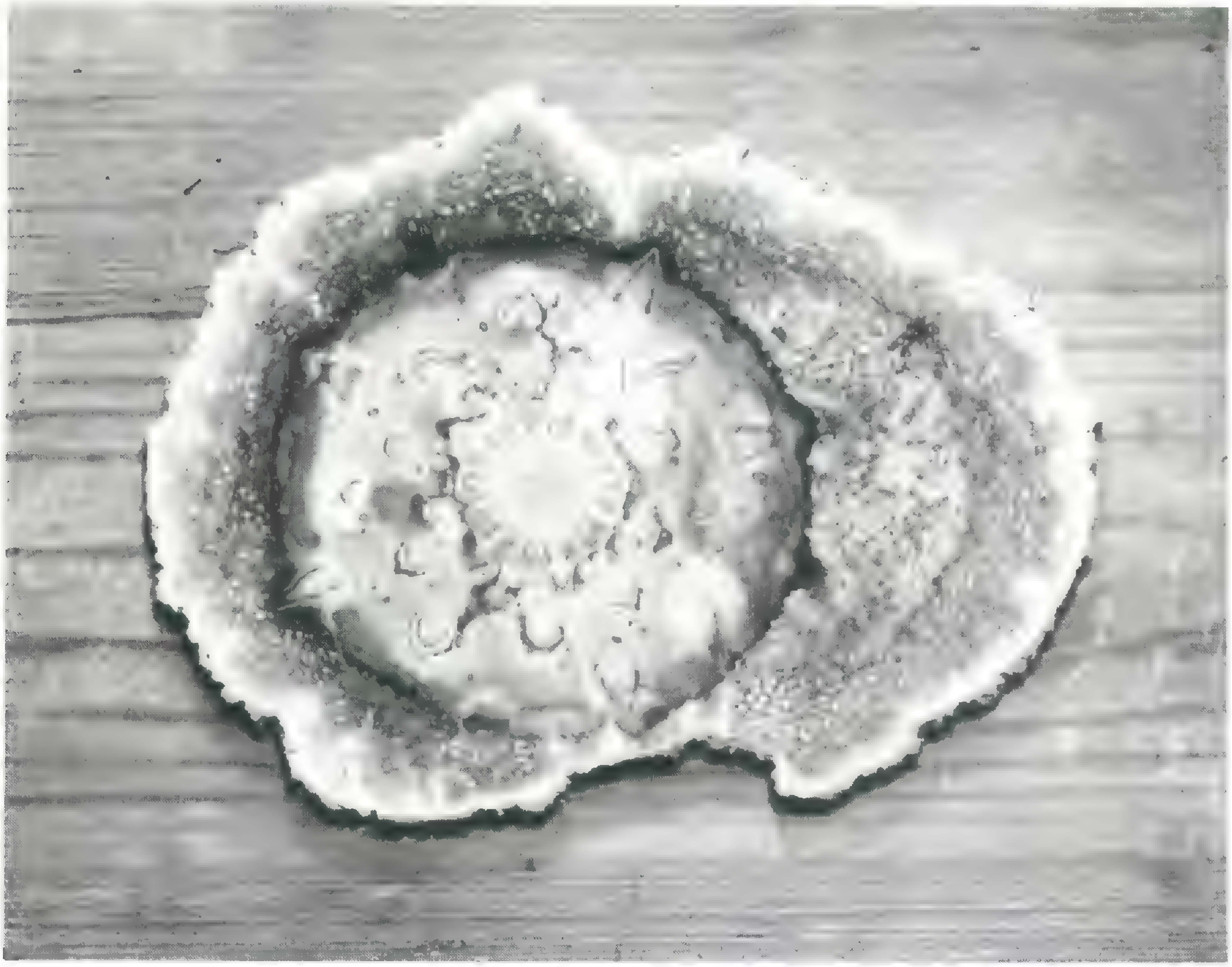
There are six other members of the Osmunda genus which grow chiefly in Japan and in the warmer parts of Asia. Hopefully, some of these may one day be more commonly encountered in our gardens. A few years ago one of our graduate students in the Botany Department at Washington University, Walter Hewitson, brought together much of what is known about the entire family and added a good deal on his own; those who are interested in a more technical and detailed account may refer to his study which appeared in the Garden's 'Annals' in 1962.

The stem of the Osmundas is more or less underground and it is not very large; it differs somewhat in the several species, being in the vicinity of a half inch in diameter. This diminutive stem is, however, enclosed by the basal parts of the leaves which persist for many years, as well as a dense mantle of small wiry roots and these enclosing materials result in quite a massive organ. When digging them in the woods it is well to be provided with a mattock, a stout shovel and a good deal of energy. The tough roots were, until recently, a favored material for potting orchids and were sold under the name "osmunda fiber."

In addition to the dense armor of roots and leaf bases, the stem is protected by an especially hard cortex or bark, much harder in fact than that of most wood. Thus they do not decay readily and this probably accounts for so many having been found petrified.

The Osmundas are widely distributed over the earth today and they wandered even more widely in the past. A few years ago I had the pleasure of observing some Royal ferns growing along a stream bank in the relatively cool hills of western India; it was a real pleasure to meet an old friend so far from home. As an indication of their wanderings the petrified stems have been found in southern England, Hungary, British Columbia, South Africa, New Zealand, India, Spitsbergen and Brazil. Many of these fossils, going as far back as the Jurassic period (about 150 million years) probably looked very much like the modern osmundas; this is based on our knowl-

A petrified Osmunda stem from Brazil. The trunk here exhibited in cross section consists of a central stem that was about 3½ inches in diameter and an enclosing mantle of roots. It was a giant by comparison with any modern Osmundas. The age has not been determined precisely but it probably came from late Mesozoic rocks—some 70 to 80 million years old.

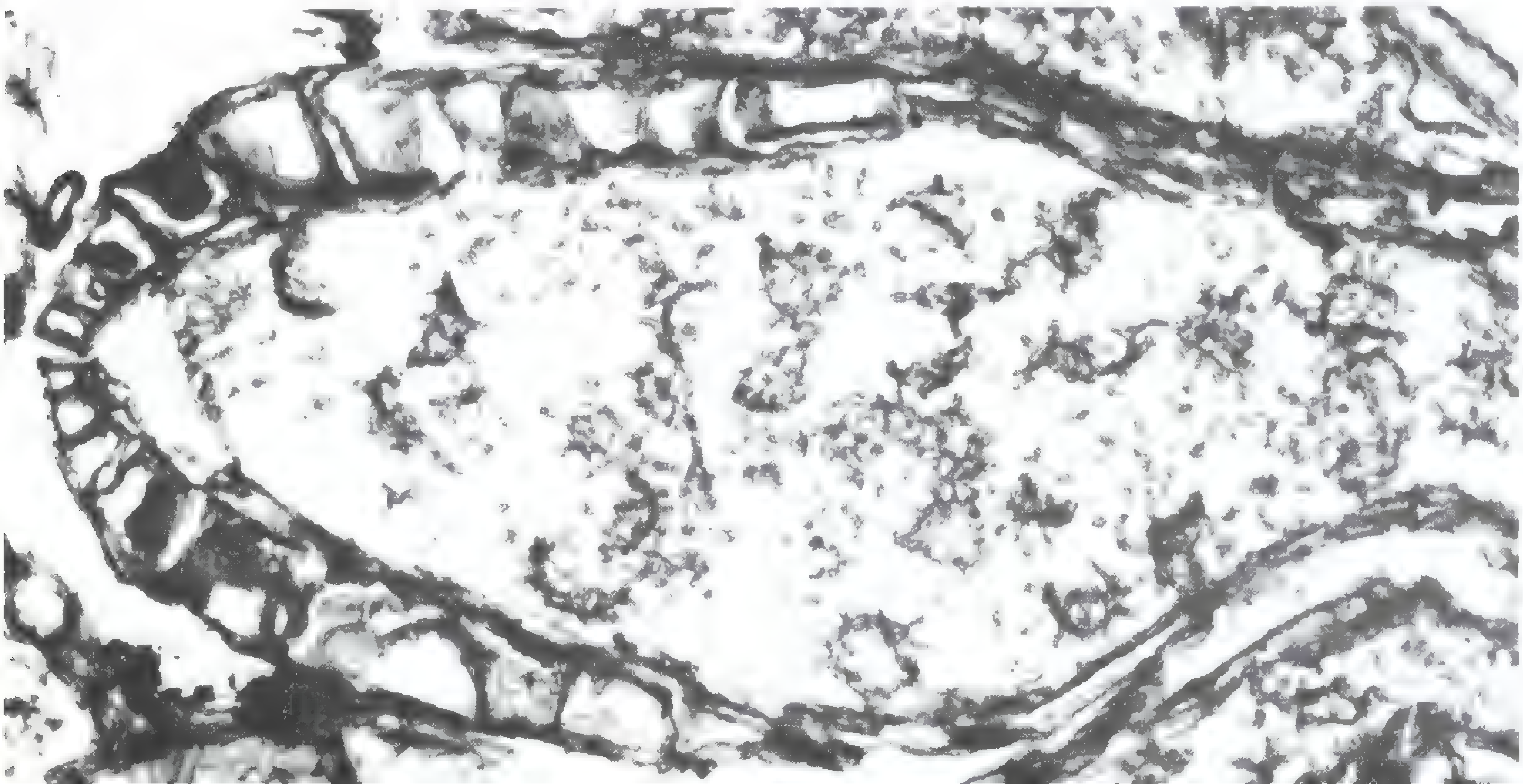


edge of the anatomy of the stems and the form of the foliage. But some were different; a few were much larger, giants, in fact, by comparison with the living ones. A few years ago I received a beautifully polished slice of a petrified trunk collected in Brazil. The structure of the stem with its characteristic leaf bases and roots left no doubt that it was an Osmunda but it was about 4 inches in diameter instead of a half inch! The mantle of roots added another inch or two which makes a rather large trunk for a fern. We do not know how tall the plant grew but it is likely that it was a tree-fern at least several feet high.

Unfortunately the stems are never found fossilized with the leaves intact but fossil leaves have turned up in quite a number of places, particularly in Jurassic age rocks, and add to our understanding of the history of the group. Some especially fine specimens have been discovered in the rich Jurassic fossil beds which outcrop on beaches along the Yorkshire coast of England. These deposits consist in part of fine-grained clays and the foliage as well as the spore sacs and their contained spores are preserved. These compare rather closely with *Todea,* another genus of the Osmunda family that grows today in South Africa. Much of what we know about the Yorkshire Osmundas has been dug out of the rocks by Professor T. M. Harris of Reading (England) University. Some years ago he spent a winter at Scoresbysund on the east coast of Greenland and among the great collection of fossil plants that he found are several members of the Osmunda family. Scoresbysund lies a little above 70° N. latitude, a good deal north of the present range of almost all ferns; the Osmundas along with the scores of other plants that he found give evidence of a very different climate there in past ages.

With fossils that are found in rocks older than the Jurassic, it becomes a

A spore sac (highly enlarged) representing a fossil plant recently found in the Illinois coal fields. This may be a very early ancestor of the modern Osmundas. Note the spiny *spores* contained within.



little more difficult to recognize, with complete assurance, relationships with the Osmunda family. Some years ago a collection of petrified stems was made in the Orenberg area of the south central part of the Soviet Union; they date back to the Permian period (about 200 million years) and they present features that suggest they may be early members of the Osmunda family. We have recently found beautifully preserved fossils in an Illinois coal seam (dating back about 220 million years) which consist of great aggregations of sporangia; the structure of these sporangia is such that they may be regarded at least tentatively as a type from which the more recent Osmundas may have evolved—possibly here is a starting point for the family, one of the most venerable in the plant kingdom.

## SPRING PLANTING

ELEANOR McCLURE

A TIDY little garden calendar, giving definite dates for spring plantings, and for feeding, spraying and other chores, would be a great boon to horticulturists in this mid-Mississippi valley area. Unfortunately, this just can't be done. Our climate is just too variable from day to day, season to season, and even year to year.

There have been exceptionally mild, open winters when trees and shrubs could be planted in February, and vegetables seeded by early March. More often we have had late, late springs, with March snows and freezes, so that planting had to be delayed until the second week in April.

While it may not be possible to give specific planting dates, we can stress one thing which I have observed through the years: the best gardens and the best spring plantings are those that go into the ground just as soon as possible. These early-bird plantings can take advantage of every good day of growing weather. Root systems are more easily established when the days are cool and the soil moist.

Even in a late year it is possible to make some early plantings—provided that garden plots and flower beds were prepared in the previous fall. One way is just to dig or plow the ground and leave it rough and cloddy over the winter. Not only does the soil absorb a surprising amount of moisture, but large clods are broken up by successive freezes and thaws. The prepared beds will be workable many days—and perhaps weeks—ahead of the surrounding compacted ground.

It is even more helpful if organic matter is dug into the soil in autumn. Compost and manure are excellent, of course, but dry leaves and other garden remnants may be spread over the plot. After adding a balanced chemical fertilizer, turn them under, so that they can be "composted" right in the garden. This saves the trouble of hauling the leaves to a pile and then back again.

Another suggested treatment for heavy clay is to spread sawdust over the surface of the spaded-up ground. Add an application of chemical fertilizer and a "light snow" of ammonium nitrate. By springtime the soil should approximate a good garden loam.

There's also an easy way to improve a new bed that is to be dug in a grassy lawn area: just cover the surface with a very heavy layer of alfalfa, spread at least twelve inches deep. The alfalfa smothers the grass, and during the winter months the roots disintegrate as well. In the spring a part of the alfalfa can be removed (to be used as a summer mulch). The rest may easily be spaded into the soil.

This method saves trouble, and it helps build up the soil at the same time. Ordinarily, we remove the sod when making a new bed, for if it is just dug in there are little remnants that are apt to sprout and present a season-long chore of weeding. The alfalfa not only kills the grass but also makes it possible to leave both the blades and fibrous roots in the soil, with substantial additions of organic matter.

Autumn soil preparation saves much time in the spring, for it is easy to plant in the pre-dug beds. All that is needed for early salad crops it to rake the soil lightly, and make shallow furrows for onions, radishes, lettuce, spinach, mustard and other greens. Barring heavy freezes, bare-root roses and hardy perennials can be planted by mid-March.

Since so few gardeners prepare beds in the fall, it is fortunate that our planting season has been extended by the wide availability of balled plants of so many varieties, and container-grown flowers, shrubs, trees and evergreens. When handled with care these plants can be moved with a minimum of shock. I have, in fact, planted whole gardens in July and August.

Early planting is much to be preferred, however, even for container-grown nursery stock. The plants will appreciate a period of good weather when they are trying to settle down and develop new feeder roots. It isn't wise to rush the planting, though, if you have to work in cold and soggy clay, for the soil may clump up and dry into rock-like clods that defy a hoe or rake. Some areas of St. Louis have a fairly mellow soil that may be workable two or three weeks sooner than the heavy clay found in many St. Louis County suburbs.

Spring transplants need special attention when there are early and unexpected summery spells in March or April. Temperatures in the high eighties, especially when accompanied by desiccating wind, can cook unfurling buds and tender new leaves. To protect them, prop up the hose and adjust the nozzle so that the finest cloud of mist just drifts over the planting. The hose should be left in one spot for several hours (usually over the hottest part of the day). Sprinkling for a short time may do more harm than good, for droplets on the leaves act like a magnifying glass to intensify the heat of the sun. On the other hand, be sure to use a very fine mist (or a fogger nozzle) for this will cut down on the water received by the root area. Frequent heavy watering can result in such a soggy soil surface that the roots "drown," with serious damage to the plant.

After the leaves grow and harden a bit, the transplants require less care. If they are to attain maximum growth, however, they must be watered regularly during their first season. Unfortunately, there is no easy rule of thumb that can be given as a guide for proper watering. "Once a week" may be too often in rainy periods, and not often enough during drouth.

It is an excellent idea to check the new planting every day, and actually probe the soil, if need be, to see whether it is wet or dry. A good way is to take a trowel and see how much moisture there is beneath the surface.

If the soil seems on the dry side, a thorough, deep irrigation is in order. I personally prefer a small, golf-course type sprinkler that can be adjusted to cover any segment of a circle, so that it can be set to water either a long narrow bed or a very large area. The sprinkler should be left in one spot for many hours. A coffee-can may be placed in the bed for a "spray gauge," for when an inch of water collects in the can, there should be ample moisture for the planting.

In other words, the need is for frequent, deep irrigation. "Over-watering" is not the result of putting on too much water at one time, but from watering too often. Daily sprinkling or turning the hose on root areas can be most injurious—especially to some miffy plants like rhododendrons and dogwoods. Both of these ornamentals may wilt if they have too much water. Seeing the wilting plant, an inexperienced gardener may add more water, with fatal results.

As an aid to more efficient watering, a rain gauge is a good investment. It is so easy to over-estimate the actual rainfall. Gardeners will often say, "We didn't water this week because it rained,"—when in fact the gauge recorded less than a quarter inch.

A summer or two ago we had frequent light showers that kept lawns and gardens green, but only the top inch or so received moisture. Trees and shrubs showed little sign of distress, although the ground soon became excessively hard and dry. Many plantings didn't receive needed irrigation, and there were extensive losses of azaleas, yews, ornamental trees and evergreens.

In our unpredictable climate, a good gardener needs to be a "weather watcher." It is important to note all of the variants of the weather on any given day, and to consider conditions in our area in previous weeks.

For example, last summer's heat and drouth brought out our hoses. Fortunately, there were fewer plant losses than in some past summers, for we had enjoyed ample rainfall in the spring. Trees and other deep-rooted plants had an adequate supply of moisture.

On the other hand, a late autumn drouth a few years ago was disastrous. Since plants did not wilt or seem to be in distress in the cool October and November weather, many gardens were not watered. As a result the soil was bone-dry in early December. Then came sudden, sharp freezes that caused such dessication and burning that there were fatalities even among very large and well-established evergreens.

The spacing of rainfall is more important than yearly averages. Even though 1966 was a "below normal" year, our gardens enjoyed an abundance of moisture in late autumn. As a result, most plants were somewhat fortified against January's drouths and freezes.

Now it behooves us to help our gardens through the "normal" weather that can be expected through 1967—a somewhat chaotic mixture of rainy spells and drouths, heat waves and freezes.

## THE OPENING OF THE HERBARIUM AT LAE, NEW GUINEA

JOHN WANAMAKER

(See note below)

In the sultry heat of the late afternoon, the crowd had already gathered. The distinguished guests were on the platform, facing the invited guests in a great semicircle of chairs, while beyond, sitting on the lawn, were many local native New Guineans who had also come to witness this occasion. As a limousine rolled up beside the speaker's stand, the smartly attired native band began to play. The director of the gardens and his wife stepped forward and greeted the Administrator to New Guinea and his Lady. Once all had again taken their places on the platform, a native honor guard moved out, taps was sounded, and the flag was lowered. Now all eyes were again on the platform and the handsome, modern building, the Lae Herbarium and office of the Lae Botanical Garden. All of us seemed to sense the prevailing atmosphere of pride and accomplishment on the part of those who had made this very special occasion possible. This was the day so long envisioned that had finally come true for them. Almost hidden under the trees was the old building, a simple tropical farmhouse, which had served not only

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The establishment of a Botanical Garden and Herbarium in New Guinea is of much interest to naturalists all over the world. This is not just because New Guinea is remote, its flora imperfectly known. It is rather that the whole area comes to be a key to the evolution of flowering plants. It has retained more species, more genera, more families, of plants whose study can help us interpret that complex evolutionary puzzle, than any other part of the world.

A naturalist from the St. Louis area, John Wanamaker, head of Biology at Principia College, Elsah, Illinois, was present at the formal opening. He has graciously shared his impressions in the following account. It is particularly interesting to us at the Garden because Dr. Frits Went brought back collections for our Herbarium and our greenhouses from New Guinea, just a few years ago. It will further interest many botanists because explorations of this whole area were carried on for years by enterprising American explorers and collectors mentioned in the account.

as an office, but until now had also housed the most extensive herbarium in the South Pacific region.

Sir Donald Cleland, the Administrator for the Territory of Papua and New Guinea, traced briefly the need for such a building as a center for botanical studies in the South Pacific. He sincerely praised its director, John Womersley, who had almost singlehandedly built up the garden and herbarium to what it is today. Sir Donald's was a knowing pride since both he and his Lady were keen naturalists. Mr. W. R. Suttie, director of forests for Papua and New Guinea, traced the history of the garden from the pre-World War II days when Mr. Womersley conceived of the idea of an herbarium. My flight from Port Moresby to Lae had been enriched when Mr. and Mrs. Suttie had rightly assumed, as we boarded the plane, I was coming to Lae for the opening ceremonies. As our plane literally flew through the narrow valleys below the rugged mountain peaks, Mr. Suttie explained the various types of vegetation to me and pointed out some of the forest practices that were being carried out.

Mr. John S. Womersley, the Director of the Lae Herbarium, more properly titled Chief, Division of Botany of the Territory of Papua and New Guinea, spoke briefly, only to introduce two distinguished guests who had flown far to be present on this day. Mr. Leonard Brass, a resident of Lake Placid, Florida, began in 1922 to visit New Guinea as a collector for the Arnold Arboretum and later on six Archibald expeditions had added 33 thousand specimens to the herbarium from many parts of Papua, the Territory of New Guinea and New Irian. (I've known Mr. Brass for several years and always thought of him as one of the early ornithologists of the South Pacific, never once associating him with the field of botany!) Mr. Womersley then spoke of another who had greatly assisted him and encouraged him—Sir George Taylor, Director of Kew Gardens of England. In years past, Mr. Womersley had collected with Sir George in some of the South Pacific areas and there he had confided in the distinguished botanist his desire to establish an herbarium here in the South Pacific. As the venture began to develop, Sir George had responded frequently by sending books, financial assistance whenever possible, and far more important—encouragement. Sir George payed a sincere tribute to John Womersley. He pointed out the need for such a garden and the important role that the herbarium had already played in exploration of many unknown areas and making the information available to botanists throughout the world. It had been my privilege to spend the previous day with Sir George and the Directors of the Botanical Gardens of Singapore, Melbourne and Sidney. How good it was to see these distinguished experts in tropical botany exclaim and enthuse over some rare plant or point out to me the affinity to some plant that I should know here at home. At times we had all gone creeping through the thickest of the brush in hopes of glimpsing one of the rare birds of paradise that abounded in the gardens. That evening there had been a buffet supper for the guests, at a club beautifully situated on a hill overlooking the harbor. There Sir George gave an informal and delightful talk describing the history and development of Kew Gardens. After the program, we all walked out on the balcony overlooking the magnificent harbor below, bathed in full moonlight, ringed by rugged mountains. Almost, though, at our feet were the vivid reminders of the price so dearly paid for this land. The ghostly outline of rusting barges and partly submerged supply ships still cluttered the area.

At the conclusion of the formal ceremonies, there followed a tour of the building where we were introduced to all members of the staff, both European and native. Displays had been set up to show us how plants were processed for the herbarium after collecting in the field. In the research rooms we saw evidence of several projects underway as well as copies of many published papers. The Herbarium was indeed fortunate to have several fine artists whose work was on display.

The library was tiny by our standards, but most adequate. Most of the books had been received as gifts from friends in distant places.

Later many of the guests walked about through the lovely gardens for one last glimpse of the great pool of night-blooming lilies and beyond to the beautifully planted war cemetery. Somehow as we wandered back to the building and paid our final respects to our new-found friends, it all seemed like a dream. Tomorrow we would scatter to all parts of the world carrying memories of this night.

⁂

THE GARDEN CLUB of St. Louis is sponsoring a STATION WAGON BAZAAR on April 29th. It will be staged on the Parking Lot of Stix, Baer & Fuller WESTROADS, from 10:00 A. M. to 5:00 P. M.

It will be colorful, captivating and convenient. All proceeds go to Shaw's Garden.

* * *

# Good News for Herb Gardeners!

The ST. LOUIS HERB SOCIETY'S

# TWO-DAY SALE of HERB PLANTS

TO BENEFIT THE GARDEN GREENHOUSES

FRIDAY, MAY 12 from 12 noon to 4 P. M.
SATURDAY, MAY 13 from 9 A. M. to 4 P. M.

In the GREENHOUSE CONCOURSE
*Off the Alfred Avenue Parking Lot*

More than 50 varieties of the most wanted culinary and scented herbs will be featured. Plants are being propagated in the Garden's new greenhouses by Society members with the advice and assistance of Mr. Paul A. Kohl, Garden floriculturist, and Dr. Derek G. Burch, chief horticulturist. The sale is planned to meet a community need for thrifty herb plants, to benefit the Garden, and to fulfill the Herb Society's purpose to "further the use and knowledge of herbs." It provides:

- **Most popular annual, perennial and biennial herbs.**
- **An information booth where your questions can be answered.**
- **Sheet of brief cultural suggestions FREE to purchasers.**
- **A "starter garden" for those new to herbs.**
- **Herb Society Cook Book and Garden Guide for sale.**
- **Alfred Avenue parking lot or easy access to sale and convenient loading of plant purchases.**

### CHECK LIST OF "USEFUL PLANTS" IN SALE

- A Alo vera (TP)
- Anise (A)
- B Basil (A)
  - Bush
  - Purple
  - Sweet
- Borage (A)
- Burnet (HP)
- C Caraway (A)
- Catnip (HP)
- Chervil (A)
- Chives (HP)
- Chives, Garlic (HP)
- D Dill (A)
- E Elecampane (HP)
- F Fennel (A)
- G Geraniums, Scented (TP)
  - Cutleaf Rose
  - Roundleaf Rose
  - Rober's Lemon Rose
  - Lemon Crispa
  - Prince Rupert Lemon
  - Nutmeg
  - Peppermint
- H Horehound (HP)
- L Lavender (HP)
- Lemon Balm (HP)
- Lemon Verbena (TP)
- M Marjoram, Sweet (TP)
- Mints (HP)
  - Apple
  - Curly
  - Orange
  - Spearmint
- O Oregano (HP)
- P Parsley (BiN)
  - Curly
  - Italian
- R Rosemary (TP)
- S Sage, Culinary (HP)
- Sage, Pineapple (TP)
- Savory, Winter (HP)
- Savory, Summer (A)
- Southernwood (HP)
- Sweet Woodruff (HP)
- T Tarragon (HP)
- Thyme, Creeping (HP)
  - Caraway
  - Golden
  - Mother-of-Thyme
  - Wooly
- Thyme, Lemon (HP)
- Thyme, Upright (HP)
- V Vetiver (TP)

(A) Annual; (BiN) Biennial; (HP) Hardy Perennial; (TP) Tender Perennial

- **SOME QUANTITIES LIMITED**
- **SORRY, NO MAIL OR 'PHONE ORDERS**

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THE MISSOURI BOTANICAL GARDEN IS A MEMBER AGENCY OF
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# SOME FACTS ABOUT SHAW'S GARDEN

The Missouri Botanical (Shaw's) Garden was established in 1859 by Henry Shaw, a St. Louis businessman, to be controlled by a Board of Trustees for the public benefit. The Garden is a non-profit institution which receives no support from the city or state, depending on the income from the Shaw estate supplemented by contributions received from the public and an annual allocation from the Arts and Education Fund.

The old stone walls and cast-iron fences, the Linnaean House, the Museum Building, the part of the Administration Building which was Shaw's Town House, relocated in the Garden in 1890, and the Tower Grove House, his country home, all date from Mr. Shaw's time. The Main Gate and display and growing greenhouses are recent or before World War I. The Climatron, opened in 1960, is the world's first geodesic dome climate-controlled greenhouse and contains the Garden's main tropical collections.

## HOURS

The Garden—70 acres—is open every day of the year except Christmas and New Year's. For the Main Entrance, grounds, Climatron, display greenhouses and Floral Display House:

| | |
|---|---|
| May 1 through October 31 | 9:00 A. M. to 6:00 P. M. |
| November 1 through April 30 | 9:00 A. M. to 5:00 P. M. |
| (Sundays and Holidays | 9:00 A. M. to 7:00 P. M.) |

For Tower Grove House:

| | |
|---|---|
| May 1 through October 31 | 9:00 A. M. to 5:00 P. M. |
| November 1 through April 30 | 10:00 A. M. to 4:00 P. M. |

The Display House presents four seasonal displays: November, Chrysanthemums; December, Poinsettias; February, Orchids; Spring, Lilies and other flowers. During the year are other shows, competitions and festivals sponsored by various Garden Clubs and Flower Societies.

Courses in Botany and Horticulture for adults are conducted by the Garden staff. Children's nature classes are provided free on Saturdays from mid-September to early June. A special nature program is held during the summer. Information on these activities is published in the BULLETIN or may be had by mail or phone. The scientific activities of the Garden are integrated with those of Washington University.

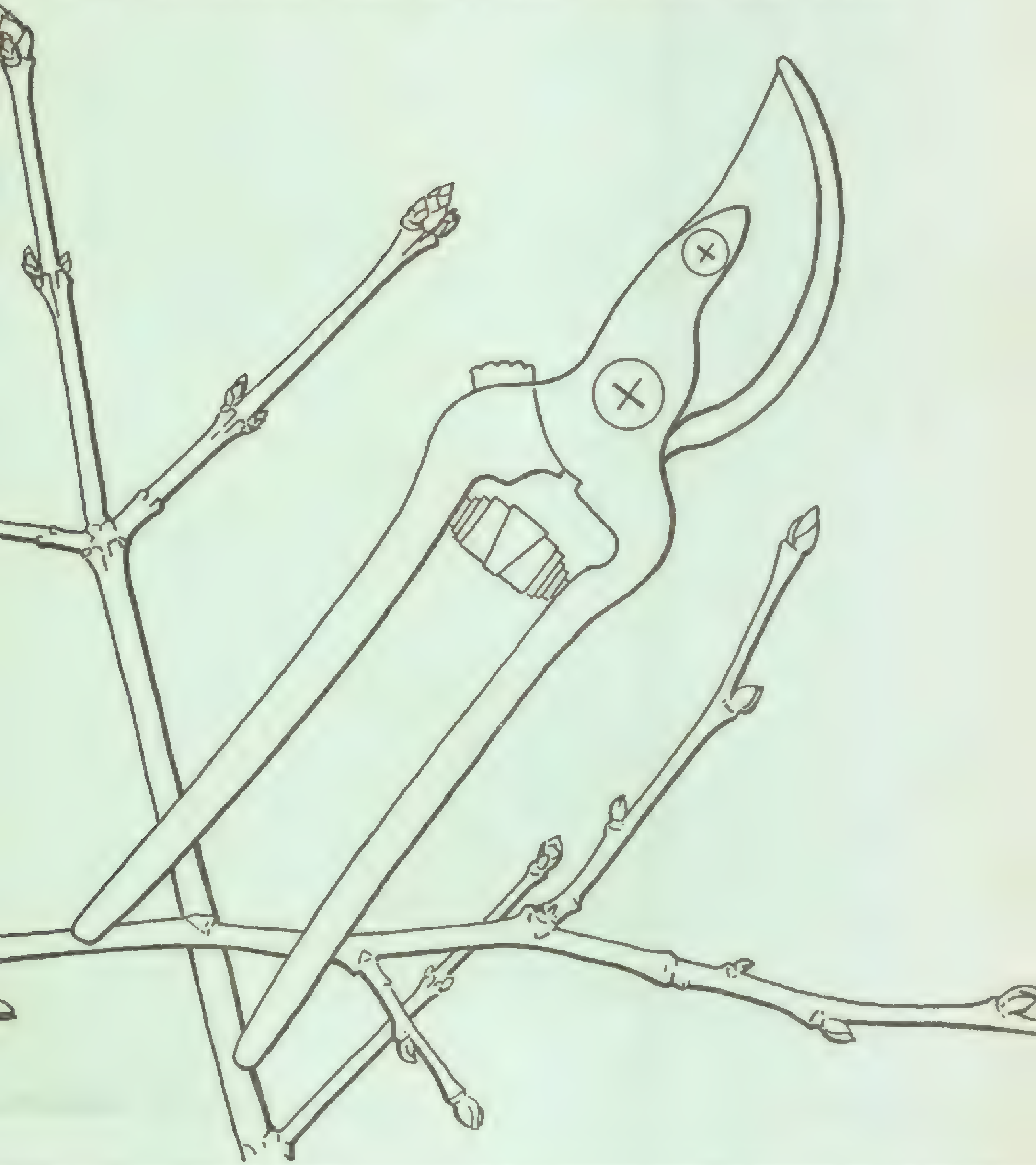
In 1926 an Arboretum—1600 acres—was established at Gray Summit, Missouri. Foot trails and roads pass through the Arboretum and are open to visitors from April 1st to May 15th.

The Garden Administration Building is located at 2315 Tower Grove Avenue, and the Garden's main entrance is at Tower Grove and Flora Place. The Garden is served by both the Sarah (No. 42) and the Southampton (No. 80) city bus lines.

Persons interested in helping to support the Garden and taking part in Garden activities are urged to do so through the "Friends of the Garden." Information may be obtained from the Main Gate or by mail or phone.

Phone TOwnsend 5-0440

# Fundamentals of Pruning Ornamental Trees and Shrubs



MISSOURI BOTANICAL GARDEN BULLETIN

VOLUME LV No. 4 APRIL 1967

COVER DRAWING BY LOUIS G. BRENNER

Mr. Brenner, formerly Arborist and Grounds Superintendent and member of the Garden staff, is currently Supervisor of Parks of the City of Webster Groves, Mo.

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**The Response of Plants to Pruning,** ***F. W. Went***
**The When and How of Pruning,** ***Louis G. Brenner***

## RECOMMENDED READING

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# Missouri Botanical Garden Bulletin

Vol. LV No. 4 April 1967

## FUNDAMENTALS OF PRUNING ORNAMENTAL TREES AND SHRUBS

Amateur gardeners and home owners often find pruning of trees and shrubs a phase of gardening clothed in mystery and best left to the services of the professional, or if practiced at all, done with little understanding of the purposes and effect upon the plant. We present here the basic fundamentals of pruning, as we understand them, to start the home gardener into a most interesting, engrossing and necessary aspect of caring for his garden. It is hoped this explanation will lead to an even deeper and more serious interest by the gardener who may wish to read and use the more detailed information presented by the authors suggested on the last page.

## THE RESPONSE OF PLANTS TO PRUNING

F. W. WENT

A gardener can do a better job of pruning if first he understands what happens to a plant when it is cut or injured in any way, and second, what the plant will be like after it recovers from the operation. The foremost consideration in any pruning or trimming of plants is the buds.

### Desirable Buds

A branch can only develop from the pre-formed buds, which are found at the end of a branch, or just above any place where a leaf is or was attached to a branch. If every bud grew, any plant would soon be a solid mass of branches. This happens at limited points in some diseases, such as the "witches broom." A plant has, however, a special device which makes only one out of every ten to one hundred buds grow, the rest being left as a strategic reserve, which can be called upon when the growing shoot is injured, cut off, or eaten by animals.

The method by which the plant keeps most buds inactive is that of diverting all food and other materials necessary for growth toward a relatively few growing buds, keeping the others starved. As soon as the growing bud is removed, the diversion stops, and the buds left nearest the cut immediately take advantage of the available food. But as soon as one of them gets the upperhand, it starts to inhibit the others by diverting all food toward itself. Thus no chaos results from pruning. The number of branches which take over from the one which was removed is definitely limited. We know very little about the mechanism of this food diversion. The only thing we can say with certainty is that it is connected in some way with the production of the growth hormone, "auxin," by the growing stem. The extreme tip and the youngest leaves of a branch produce a large amount of auxin. As soon as the production of this auxin by the branch tip stops, the diversion of food toward that tip stops, and other buds get a chance. When one or a few of these other buds produce sufficient auxin, this diverts the food toward them, and the situation is the same as it was before, except that one or more other branches have taken over from the original one. Thus the plant automatically adjusts itself to the effects of pruning or injury.

By pruning, a gardener can make almost any inactive bud grow. This is of special importance in shrubs and trees which form their flower buds in the year previous to blooming as in the case of cherries, peaches, apples, plums, apricots and many flowering shrubs. In these deciduous fruit trees, the top buds and the ones of last year's growth are predominantly vegetative, or in other words, give rise only to leafy shoots, and do not contain pre-formed flowers. The more swollen buds on the older woods are predominantly flowering buds. If left untrimmed, a larger proportion of the developing buds will be vegetative, which not only interferes with the development of flower buds, but also diverts food from growing fruit. When the majority of the last year's shoots are pruned off, a greater proportion of flowering shoots can develop and set fruit. And still a certain number of vegetative buds, which are mixed in with the flowering buds on the older wood, will grow out to keep the plant in a good, balanced condition.

In other plants, like the eastern lilac, the apical buds are usually flower buds, so that pruning during the winter destroys the next spring's flowers. It is not practicable to list for each plant when and where the flowers are preformed, but anyone can find this out for himself. A good hand lens and a few needles comprise the necessary equipment. Carefully pare the bud scales and small leaves away from a bud. If it is a flower bud, perfectly developed but as yet tiny, flowers will be found in between the small leaves. If only smaller and smaller leaves are seen inside, the bud was vegetative. All this is visible with a ten-times magnifying glass.

## Plumbing Systems

There is another—and important—reason why shrubs should be pruned. This is related to the reason why a shrub does not grow into a tree even though it seemingly has all the attributes of a tree. But just as the shoot of a shrub gets a good start it stops growing, and in many cases, it dies back to the ground, and has to begin all over again. Therefore, in the natural state, a shrub usually has much dead wood and has many stems which grow up from the root crown. In this respect a shrub holds the middle ground between a tree and a perennial whose above-ground stems die at the end of each year (aster, delphinium, paeonia). The efficiency of the plumbing system of trees, perennials, and shrubs is the important factor in determining their span of life. The tree is, from every standpoint, an engineering marvel. Its plumbing system is most efficient.

The plumbing system of perennial plants is so inefficient that, after a season's growth, the strain under which the water moves through the vessels has become so great that the buds higher on the stems cannot make good connections and will not grow any more. The whole stem dies, and a bud in the rootstock, near the source of water, starts next year anew.

Something like this happens in shrubs. In the course of a few years, in many shrubs, the growth of the highest buds is not possible because of the relatively poor water supply system. An indication of the water stress is given a few years before the climax, when the new developing leaves stay smaller and flowers become smaller also.

When the main stem of a shrub dies, new shoots start to grow from near the root crown, and take over the place of the dead stem. The plumbing system in these shoots becomes overtaxed in the same span of time, and then everything starts over again.

In this case pruning can help, not by improving the plumbing, but by removing the buds too far away from the roots, causing buds lower down to develop where the water piping system will not be overtaxed so soon. There are different symptoms which show how much of the old branch has to be removed. Wherever the old branch seems thin in comparison with the number of leaves it has to supply with water, it should be cut. The buds on the thicker part of the branch farther down will give rise to more vigorous branches. Also, the branches bearing few and small leaves, as a consequence of a restricted water supply, should be cut off. In this way nature is helped and the shrub can be kept more vigorous, because it is not necessary for the whole branch to die before new shoots can grow.

Thus we have seen that the scientific foundations for pruning are: (a) removal of the less desirable buds, so that the more desirable buds can develop, and (b) removal of the weak buds, poorly supplied with water, thus forcing better located buds to grow. And the reason why new buds start to grow when the growing shoots are removed can be explained by the diversion of food toward the growing shoots.

The above explanation and the pruning directions given on the following pages should constitute valuable reading for every gardener who wants to prune more intelligently. These explanations here should emphasize, for instance, the repeated recommendations that old, useless or weak shoots be removed in favor of desirable and well placed shoots. *The fact that food is diverted to the buds left nearest the cuts should impress the pruner with the importance of carefully considering the placement of the buds to which he cuts during pruning operations on various shrubs and trees.*

# THE WHEN AND HOW OF PRUNING

LOUIS G. BRENNER

## The Reasons for Pruning

Pruning is primarily a process of removing portions of a plant to achieve certain specific results essential in good plant grooming. Some physiological reasons for pruning are set forth in the above paragraphs where Dr. Went discusses response of plants to pruning. Pruning should be undertaken with definite purpose in mind and not just because one sees his neighbor cutting away and decides this might be a good idea, especially if it is a beautiful day to be outside.

Many otherwise fine garden trees and shrubs have been ruined by thoughtless hacking. Valid reasons for pruning may be listed as: shaping or grooming, in which small portions of the plant are removed to maintain general conformity typical of the species; to maintain youthful vigor necessary for flowering and fruiting of shrubs; to improve health by removing diseased or injured parts; to maintain a plant in a specific habit for specific purposes; and to balance the crown to an injured root system as occurs in transplanting. Finally, pruning must be undertaken when plants have been injured by storm, romping children or pets, and other accidents.

## Pruning Tools

Most home gardeners will be able to give their plants good maintenance with comparatively few tools. At least three tools are essential—a good hand pruner, a lopping shear (long-handled pruning shear) with twenty-four inch handles, and a curved pruning saw, having not less than eight teeth to the inch. Those having numerous trees may want to add to this list a curved blade pole saw and a pole shear and perhaps even fifty feet of one-half inch or larger rope, and a twenty-foot extension ladder.

Following are some considerations in selecting tools for pruning work. As with most garden tools, it is most advisable to purchase high quality tools for pruning, for good steel blades stay sharp and make neat cuts, essential to rapid healing of wounds. Handles of pruning tools are under great strain and must be of high quality.

## Hand Pruning Shears

For most gardeners the hand pruning shear is an indispensable tool. For general, all-around use, a shear having an overall length of about eight inches will cut the smallest twig and also fairly large branches. In using this tool, the gardener is warned against using a twisting motion as he cuts, for this can cause springing of the blade and result in failure of the tool to cut clean. The gardener is also cautioned against cutting larger branches of tougher woods with the hand pruner, for this task is more effectively accomplished with the lopping shear. Gardeners will find the type of hand pruner having a lock high on the grip near the pivot point easier to use. Those with a lock on the lower end of the grip often result in painful blisters on the palm of the hand.

### Lopping and Pole Shears

For those having many shrubs and trees in their garden a good lopping shear is an important tool. This long-handled shear is designed for making cuts too heavy for the hand pruner. The pruner will also find it eliminates some stooping, and its long handles make it a useful tool for trimming low-hanging tree-limbs without the use of a ladder. As with the hand pruner, caution is required not to make a twisting motion when heavier limbs are cut, as this could spring the blades. Limbs that cannot be cut easily with the lopping shear should be left for the saw.

The pole shear makes a very handy tool for light shaping of trees and very tall shrubs. It must be remembered that the cutting capacity of this tool is very limited and does not exceed that of the hand shears. The pole shear has the distinct advantage of reaching those difficult branches impossible to reach with a ladder and hand or lopping shears.

### Pruning Saw

Though an ordinary carpenter's saw can be used in the pruning of large shrubs and trees, the gardener will find the pruning saw an easier tool to use. Pruning saws have a coarser set to the teeth. Some have teeth set to cut on both push and pull stroke, and will cut green woods much more easily than other saws. The gardener will find a narrow-curved-blade saw with fine teeth most handy for general pruning. Do not use the narrow, straight-blade saws having fine teeth on one edge and coarse on the other since these often cause serious injury to nearby limbs when working in close places. A large saw similar to the carpenter's saw, but with teeth set like a pruning saw, is very handy when pruning large limbs in trees. A pole saw having a curved, fourteen to eighteen inch blade mounted at the end of a ten to twelve foot pole is quite handy for tree work.

### Paint

It is standard practice among tree surgeons to paint wounds resulting from removal of limbs or accidental damage to bark to guard against infection of exposed wood by fungi and ravage by borers. For this purpose there are definite limitations to the sort of material used. The gardener is cautioned against using paints containing volatile thinners such as turpentine or benzol. These may damage the tender growing tissues which form the natural healing cover of the wound. Asphaltic paints are recommended. Specially-prepared wound dressings can be obtained from reliable seed stores and nurseries, and would doubtless be the safest dressing to use.

### Care and Maintenance of Pruning Tools

Like all sharp-edged cutting tools, the gardener's pruning tools will require regular and careful attention if they are expected to work efficiently, make neat and clean cuts so necessary for quick healing of the pruning wound. Immediately after use, tools should be washed clean of all sap and gummy residues with a stiff brush and water, dried thoroughly and well oiled to prevent rust. Tools used to cut away diseased portions of plants should be disinfected with strong alcohol to prevent possible infection of other healthy plants. Blades of pruning and lopping shears should be touched up regularly with an oil stone or fine file. However, only the beveled-edge blade should be so sharpened, the other unsharpened should never be touched. If the shears fail to make a clean cut or tear bark in cutting, the blade has probably been sprung by twisting the shears in cutting, or attempting to cut too large a stem. Sharpening of pruning saws should be left for the professional. The cost is nominal. Handles of pole shears, lopping shears, and pole saws should be rubbed with linseed oil occasionally to keep the wood smooth and free from weather cracking.

### When to Prune

Proper time to prune has consistently baffled more gardeners than any other part of this relatively simple garden task. Necessarily, time of pruning is directly connected with the purpose cutting is to achieve and will be done in particular seasons of the year. Old hands at gardening say the time to prune is "when the knife is sharp," but his knife is always sharp and is wielded with due consideration for each individual plant. For those less experienced, the following thoughts may prove helpful.

### Pruning for Shape

A large part of garden pruning will fall into this group which could perhaps be better named as "grooming." Healthy, vigorous plants quite often need a bit of careful snipping to keep them well formed and this can generally be done best during the growing season while the plant is in leaf. Flowering trees and shrubs, however, would be more properly shaped during the second and third week of July to insure against loss of flower buds on the branch thus shortened. Hedges generally may be shaped (sheared) at any time during the growing season with only the caution that heavy shaping be done in the first cutting and not left until August. Heavy shaping of hedges late in the season could cause development of abundant new twig growth which may not mature (become woody) and be subject to winter freezing injury.

Most woody plants, it has been shown, especially shrubs, respond vigorously to pruning, and this is essential toward keeping blooming shrubs in heavy flower. Simple general rules may be practiced by the gardener to keep his shrubs in good vigor and flower. Spring blooming shrubs such as Forsythia, Weigelia, Van Houtte Spirea, Philadelphus are best pruned and thinned out shortly after flowering. This is because the plants bloom on stems developed during the preceding season. Cutting with a generous hand for house decoration will make most of this task a pleasure. Summer, and the few fall blooming shrubs such as crepe myrtle, Vitex and Buddleia, bloom on stems developed during the current season and should be pruned, thinned and shaped in early spring.

Holly, long the plant symbol of the Christmas season, has become increasingly popular in midwest gardens. Many gardeners decline to prune their hollies at the Christmas season in fear of injuring their trees. American and English hollies can safely be pruned for Christmas decoration. Such pruning, if carefully done, will maintain the characteristic pyramidal shape of the tree and will stimulate the production of new shoots which will bear heavily the next season.

Roses have been a popular summer blooming shrub of midwest gardens since colonial days and make an excellent subject on which the gardener may apply the pruning principles set forth in these paragraphs. Roses, because of a rather fast habit of growth, respond quickly to pruning, thus enabling the gardener to correct and perfect his technique within a short period. Roses of the hybrid-tea and florabunda type in general should be shortened to approximately eighteen inches about mid-November, to prevent strong winter winds from shaking the plant loose in the soil when the soil is extremely moist as during a winter thaw. Major pruning of these roses is left until the end of March, at which time it is safe to remove winter protection. At this time dead canes and those killed by winter injury are removed, and remaining stems shortened to 8–12 inches. All stems with a diameter less than that of a lead pencil are cut away. It is of utmost importance in pruning roses to maintain a very wide and spreading habit of the plant to facilitate later pruning, and to permit thorough coverage of leaf surfaces later in the season when the plants must be sprayed for insect and fungal pests. Such an open habit is easily attained, if the pruner will cut about ¼ of an inch above a bud pointing outwards.

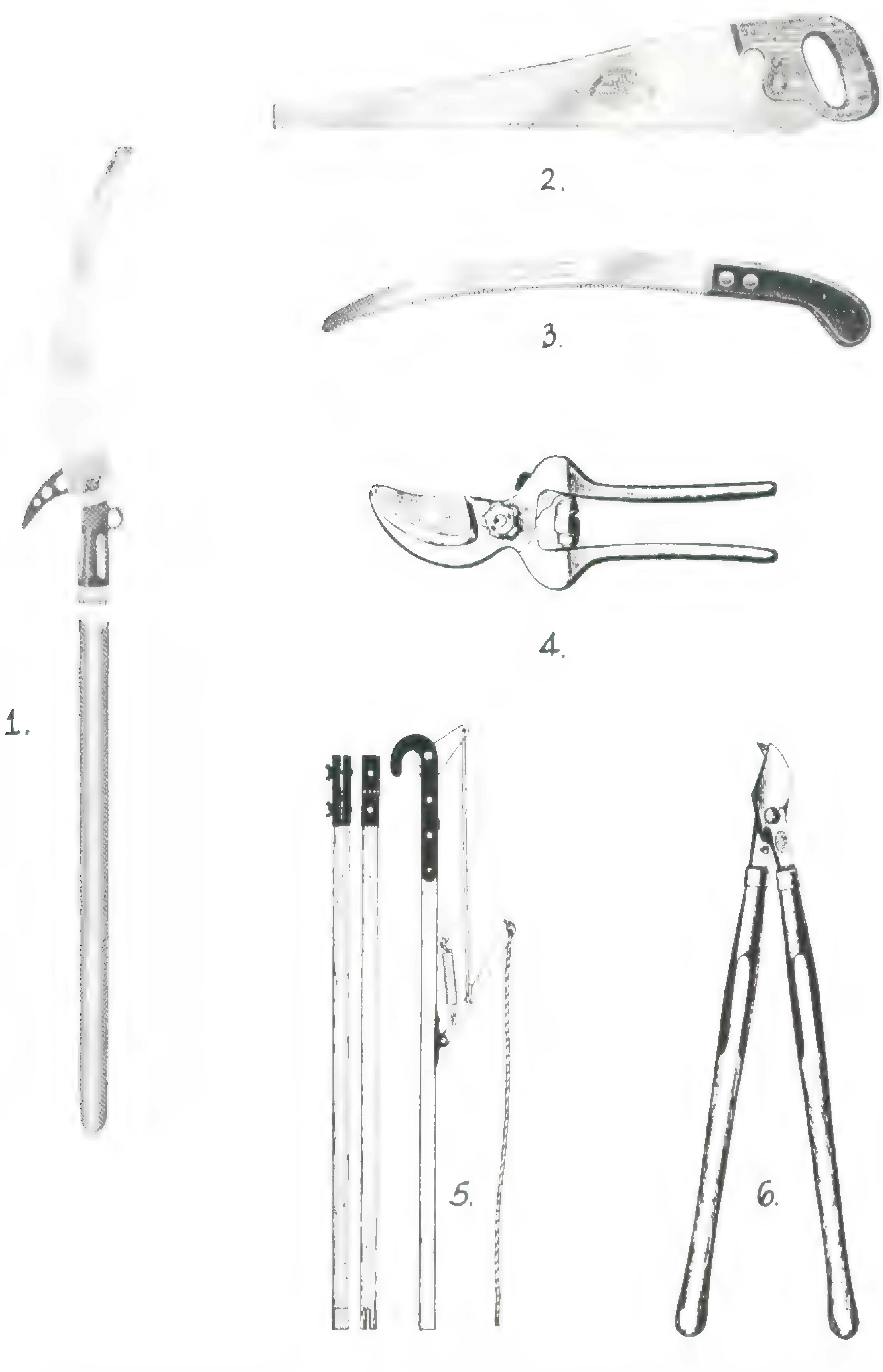
Climbing or rambler roses are best pruned shortly after blooming. At this time all the canes should be cut back severely. Climbing roses bloom best on new wood, hence cutting assures the gardener of strong, vigorous blooming shoots for the following season. The gardener will find it wise to reduce the number of shoots, otherwise the canes will become too crowded on the trellis where there is great competition for light. Thus they will fail to develop abundant flower buds.

### Pruning for Disease

Occasionally the gardener will find need to remove portions of branches or even the entire limb or shoot in the control of certain virus diseases or borer attacks. Such removal should be made at their first notice, cut back far enough to be certain all infection is out, and the removed portions burned on the trash fire immediately.

### Pruning at Time of Transplanting

Almost every plant that is moved from its original growing site will need some pruning attention to balance the stem structure with the root system reduced by the process of digging. Plants dug with bare roots will need at least half of the branches removed, leaving only a well-spaced skeleton of main limbs. Balled plants will usually succeed if at least one-third of the branches are removed. Such pruning is gauged to insure quick recovery from the shock of transplanting and also to prevent die-back of limbs by reason of a reduced root system unable to sup-



Types of pruning tools as suggested in the text: 1. Pole saw; 2. Pruning saw; 3. Curved pruning saw; 4. Hand pruning shear; 5. Pole pruner; 6. Lopping shear.

port an overbalanced top. Container-grown plants generally should be left unpruned unless roots have grown through the bottom of the can, in which case the top will have to be brought into balance by removing branches to approximately half of the total length of roots lost. In most cases it will be found practical to cut off roots growing through the bottom of the can to facilitate removal of the plant without breaking the ball of soil encasing the roots within the can. Pruning of top for transplanting should be done at time of moving the plant and will generally be found easiest while the plant is out of the ground and can be maneuvered into handy positions for making precise cuts. Shade trees such as oaks, sweet-gums and maples; conifers such as pine, spruce, cypress; and broadleaf evergreens such as holly and bullbay magnolia should never have the main stem cut back because the single straight trunk is essential for development of a stout, sturdy specimen in later years of growth.

### Pruning for Storm Damage

Limbs and portions of limbs damaged by storm, or in other ways, should be removed to the trunk or cut back to the nearest branch immediately, and the cut painted to prevent possible infection. Prompt attention at any season will eliminate dangling members which could cause further injury to the remaining portion of the plant.

### Pruning Shade Trees

Shade trees are generally pruned through the winter and into early spring. Absence of leaves renders it easy to observe the branching pattern, and also makes individual branches lighter in weight, thus reducing the hazard of stripping bark when limbs are cut for removal. It is wise to observe some few trees as exceptions to this rule. American and slippery elms and silver maple bleed badly if cut in early spring, and may continue to do so until mid-June. These trees are properly pruned about the end of June, or if in winter, not later than the end of December. Shaping-pruning, where limbs less than one and one-half inches are removed, or when dead limbs are to be removed, may be done at any season. Many gardeners paint wounds and cuts one inch or more with a wound dressing.

### How to Prune

Despite the fact that many fine, well-illustrated books and pamphlets have been written on the subject of pruning, the gardener will draw his best lessons from his own garden if he will but take the time to closely observe each individual species and its peculiar manner of growth and blooming. Particular attention must be given to the arrangement of the bud, leaf and flower and shoot buds because these, as pointed out by Dr. Went, determine the type of growth the gardener can expect from the plant after pruning.[5]

Among shrubs and trees commonly grown in gardens, there are two types of arrangement of the bud on the twig. These give origin to typical

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[5] Buds are easily recognized in the dormant season; a similar bud exists at the base of the leaf during the growing season.

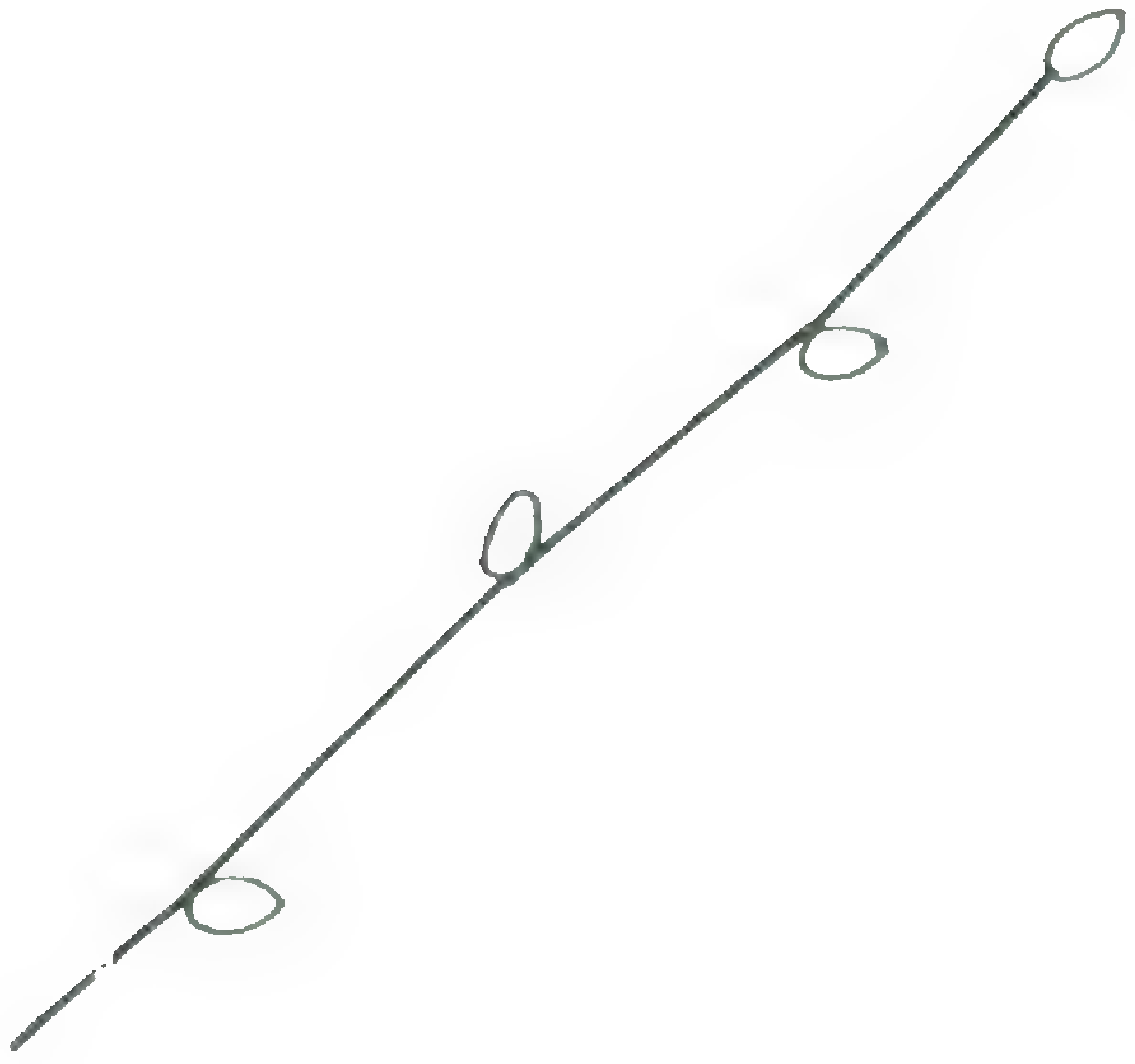


Fig. 1

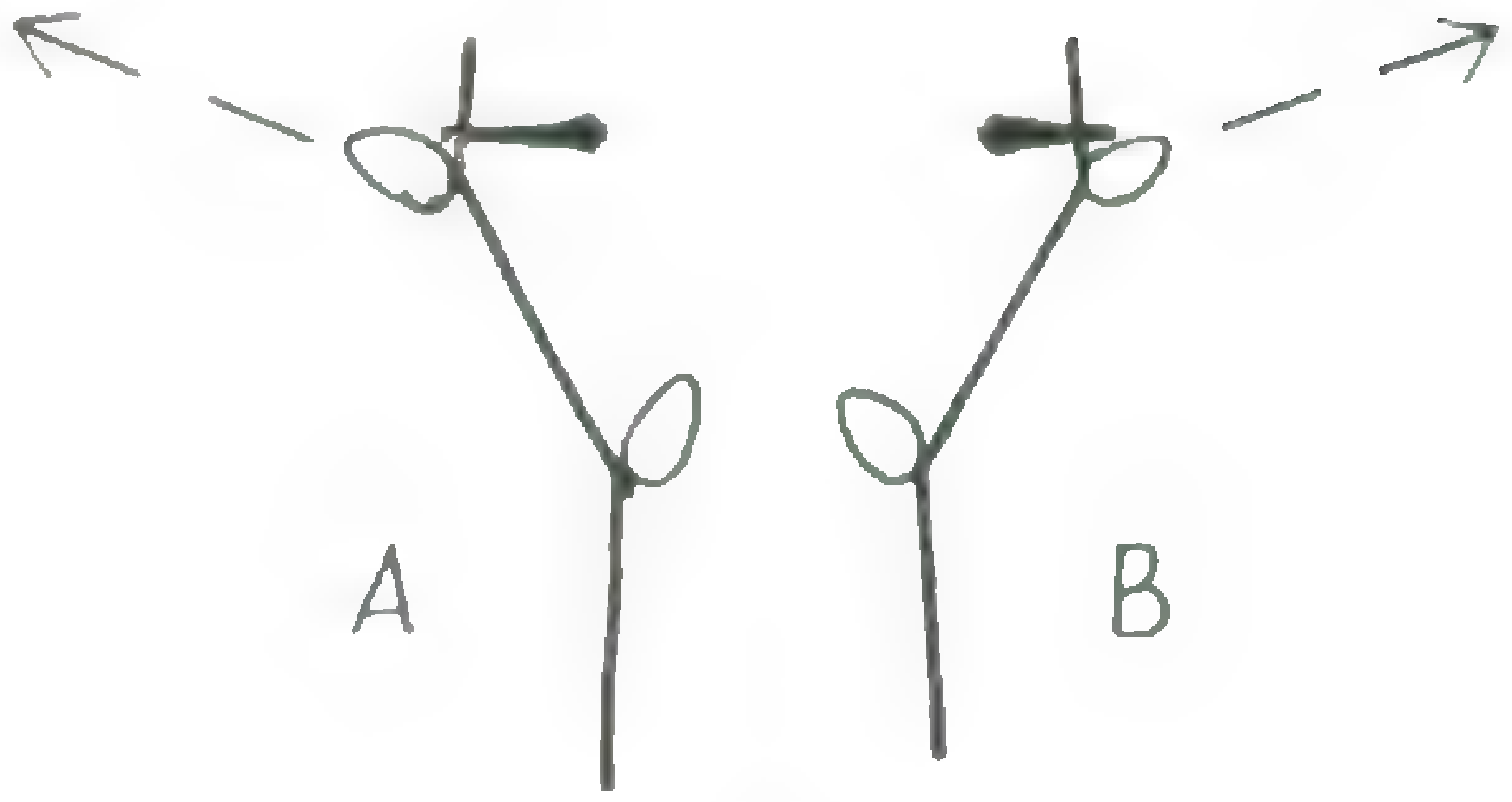


Fig. 2

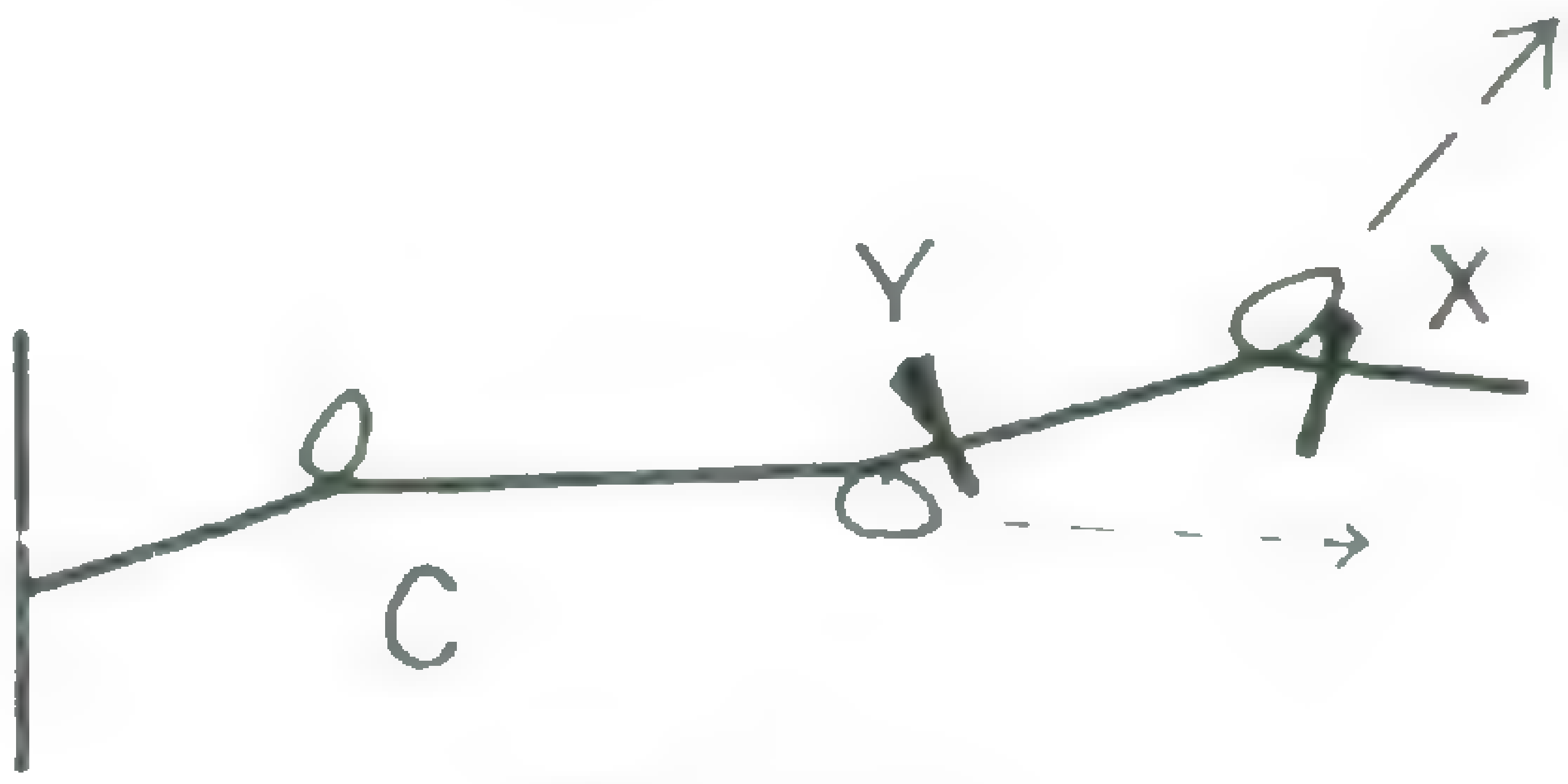


Fig. 3

Fig. 1. Typical stem with alternate buds. After pruning direction of growth is determined by position of bud immediately below cut. Fig. 2 A, B. Top view of alternate budded branch, shows pruning cut to direct growth right or left side. Fig. 3. Side view of alternate budded branch, cut at "X" encourages growth out and up, at "Y" encourages horizontal growth, rarely down.

habits of growth of the plant. Basically, buds have either an alternate or an opposite arrangement on the twig. The gardener will find that a greater number of plants will have an alternate arrangement of buds. Such arrangement of buds accounts for more common habits of growth. Position of the last bud or pair of buds left on the twig will determine the direction in which the new shoot will grow. Buds on the top of the twig will probably grow upward at an angle. The bud on the side of the twig will grow outward at an angle, and to the side to which it is directed. In opposite budded plants, when the cut is made to a pair of buds in lateral position, both buds often grow. Observation of bud arrangement and care in selecting the terminal bud to be left is of utmost importance in the development of shapely plants. Care in selection of terminal buds can also reduce much pruning work later on, if the pruner will exercise caution not to direct the bud and its potential shoot toward another branch where there is little light for growth and possibility of chafing of branches.

The gardener who would become proficient in the art of pruning must learn that the pruning task is not finished when the shears are washed, oiled and hung on the rack, and the brush disposed of. He must watch the buds left from his cutting expand, the shoot lengthen and mature to flower and fruit. From close regular

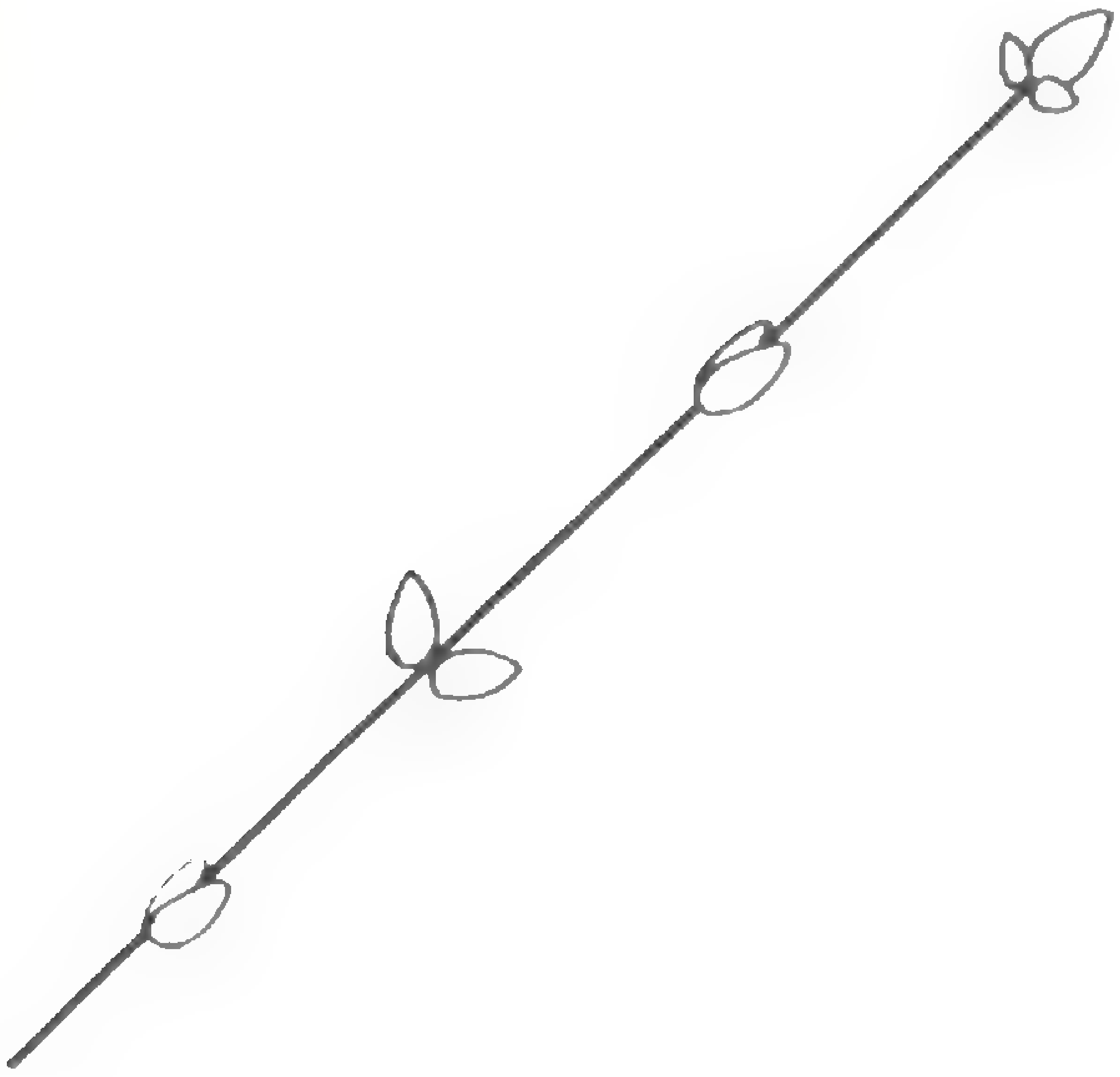


Fig. 4

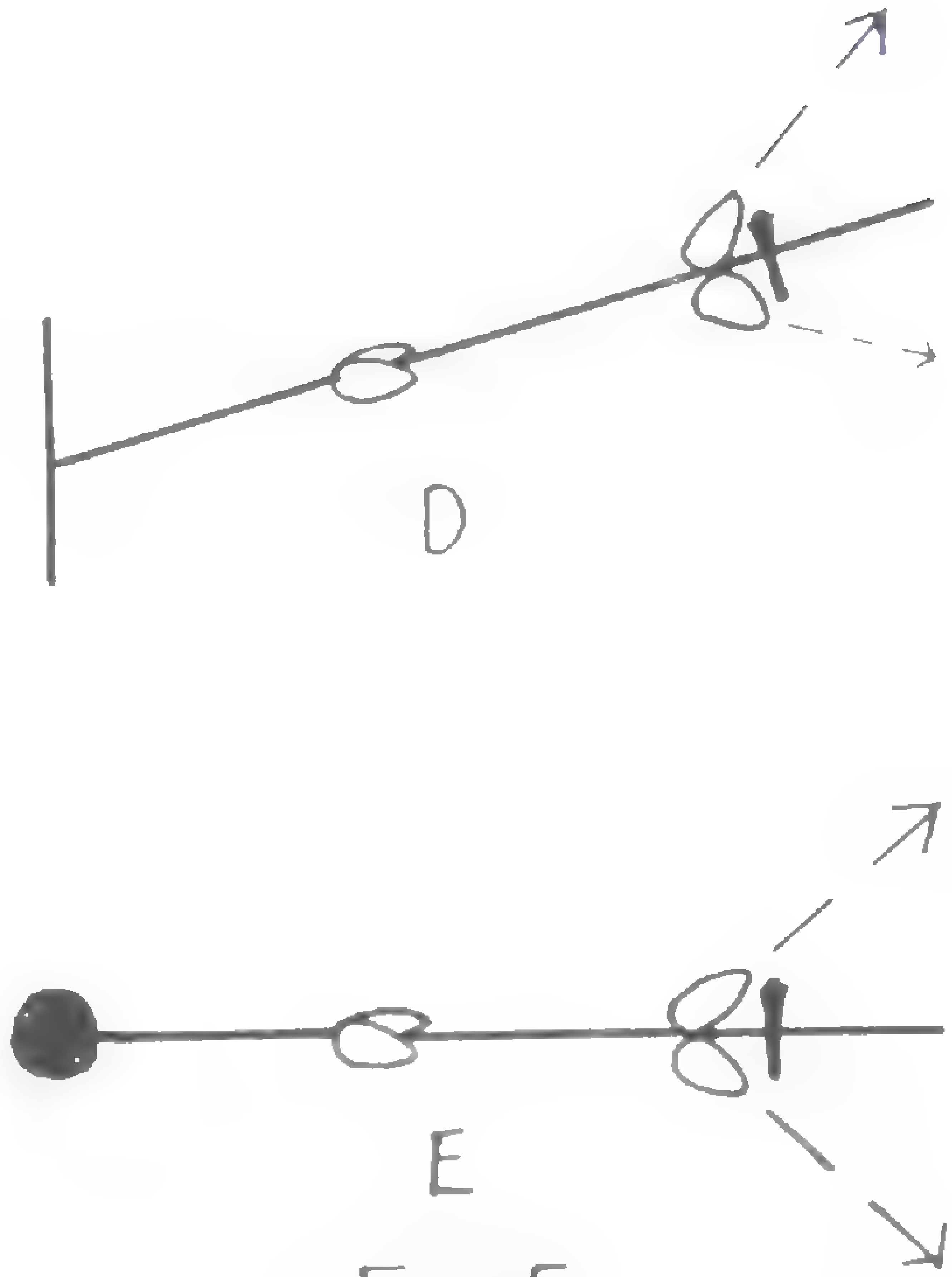


Fig. 5

Fig. 4. Typical stem with opposite buds; note each pair of buds usually arranged at right angle to pair above and below on stem. Fig. 4 D. Side view of opposite budded stem, buds in vertical plane; top bud produces most vigorous shoot in out and up direction. Fig. 5 E. Top view of opposite budded stem, buds in horizontal plane; both buds usually grow at equal rate in horizontal plane.

observation he will learn his mistakes and how to correct them when the pruning shears are next taken in hand. He will also experience the supreme satisfaction of directing the course of nature in one of the few ways permitted to man.

### Pruning for Shape

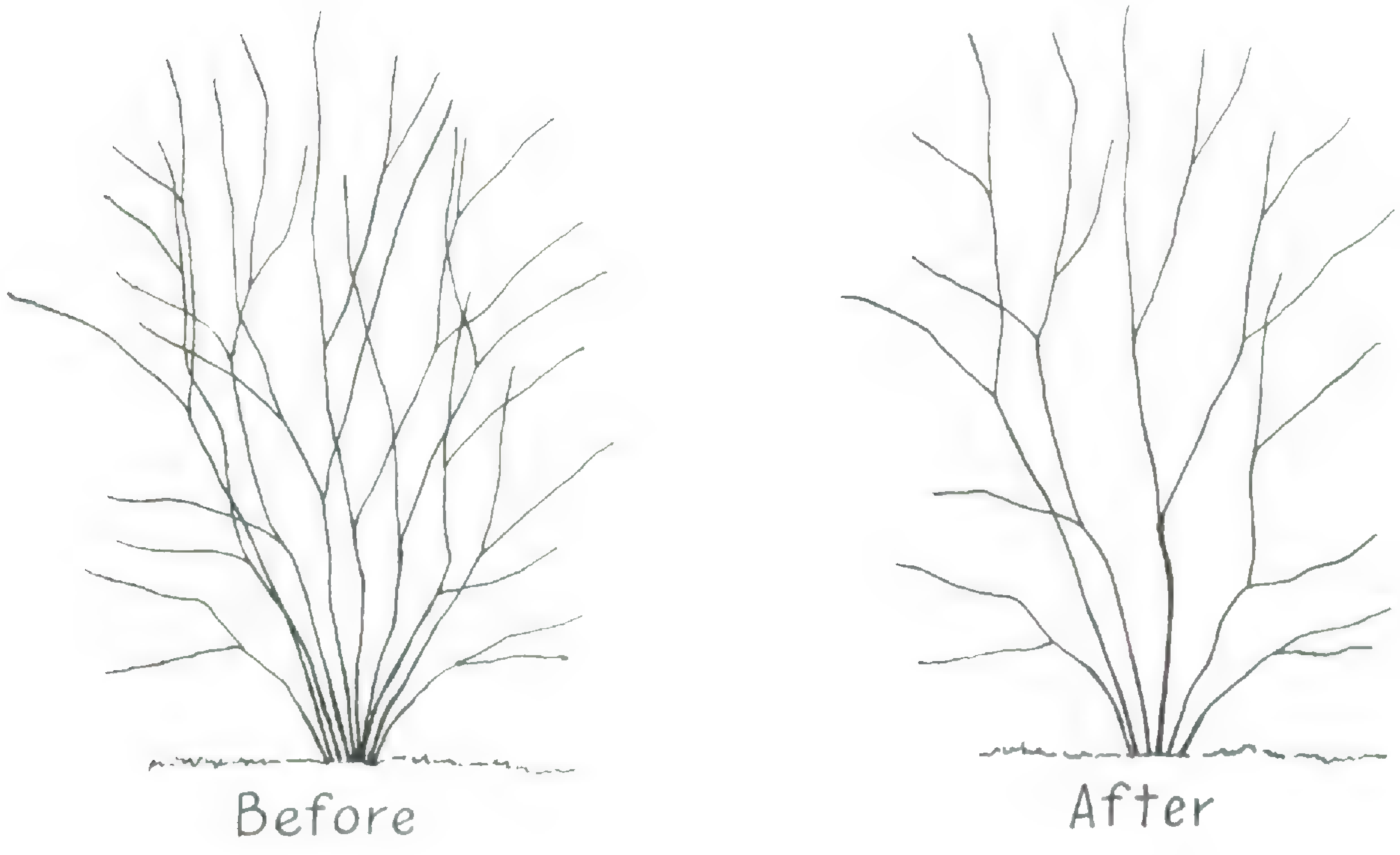
Often trees and shrubs send out a particularly vigorous shoot which, if left to continue growth, would spoil the appearance of an otherwise shapely plant. Such shoots can be safely shortened to proper length early in July. It is important that such shoots on spring-flowering shrubs be shortened in July to permit resulting lateral growth to mature and develop flower buds. In most cases, the gardener will find his hand pruner will perform this task, or for trees, the pole shear.

Shaping of evergreens, such as junipers, yews, arbor vitae, should be done in early spring, as the plants usually reach maximum elongation of the new shoot early in July. Pine, spruce and fir can be shaped by snipping off the tips of over-long branches in March or April. However, care must be exercised not to remove more than one-third of the total leafy area of any one limb.

### Pruning for Vigor

Shrubs, more than trees, require pruning attention to maintain vigorous shoots, capable of producing abundant flowers. Most often, the gardener will find it most practical to remove old shoots to the ground level, using the lopping shear or small saw. Usually the third year after the shrub has been planted, and by each succeeding year, it is advisable to remove several older shoots to maintain a youthful, vigorous condition of the plant. Generally, the dark, heavily-barked shoots are old and produce few flowers. Such old shoots, because of their lack of vigor, are prone to attacks by borers, which may be attracted in sufficient number to bore into younger shoots as well. The pruning gardener should take advantage of the fact that most shrubs bloom best on young wood. Spring-blooming shrubs should be thinned quite harshly to force abundant new shoots to bloom the next season. Such cutting, of course, takes place soon after flowering. Summer-blooming shrubs receive similar treatment in early spring.

In any case, the gardener should check his plants regularly, and when the new shoots reach about four inches they should be thinned to an even spacing to insure even light to all. Shoots cut to the ground are often replaced with four to five vigorous new shoots. The gardener will find it advisable to leave only one or two of the strongest, and these spaced about four inches apart. Attention to this detail



Flowering shrubs should have old stems removed, remaining stems thinned out if necessary, to encourage young vigorous growth capable of producing abundant flowers.

will make future removal of old stems much easier, because they can be easily reached with lopping shears or saw, without injury to nearby shoots.

Certain old shrubs that have gone without pruning attention for many years may be rejuvenated by removal of old stems over a period of at least two years. Such removals should be done in early spring.

Some spring-blooming shrubs, such as Forsythia, the gardener will find will bloom especially well if the entire plant is maintained in a quite open branch system to permit abundant light to reach the stems, in which case the plants often bloom over the entire length of the shoot.

## Pruning Trees

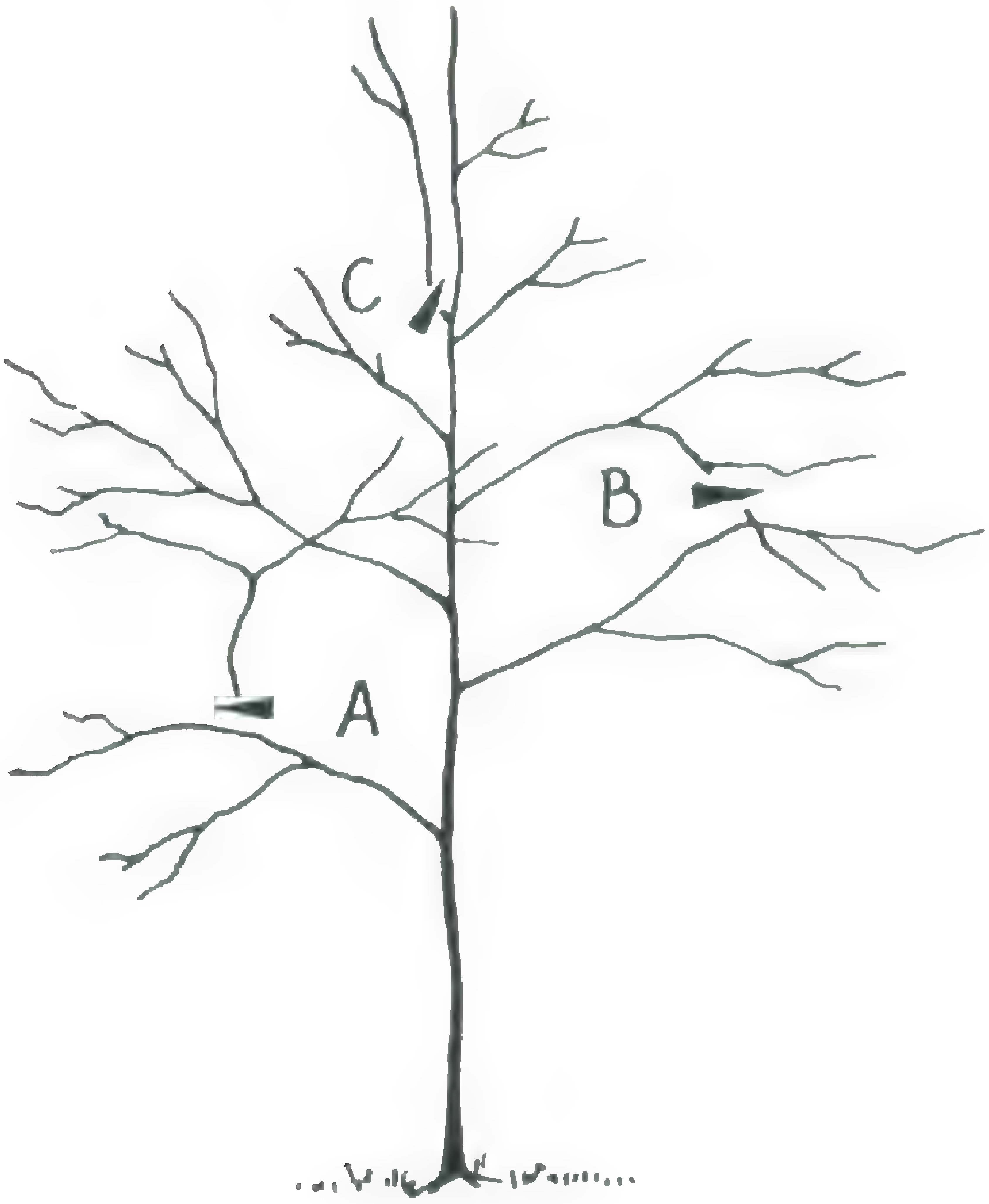
Trees in general require less pruning attention than shrubs but, unlike shrubs, whose outstanding characteristic beauty lies in continual rejuvenation, trees gain beauty and majesty through age. The pruner, therefore, is cautioned that the effect of his pruning of trees is of long duration. Pruning of shade trees is most often directed toward development of strong, straight trunks with a well-spaced scaffold of limbs. Pruning should begin with the first season after the tree is planted. Early attention is directed toward development of the straight trunk without narrow crotches or "V"s. Branches are encouraged to leave the trunk at wide angles, as these prove strongest in strong wind and storm. In later years, as increasing numbers of limbs develop, attention is given to removal of limbs that grow toward the interior of the crown, and also those that lie across one another and chafe and rub.

It is especially important that flowering trees, especially crabapples and hawthorne, receive corrective pruning when quite young, for major limb removal after the plant matures to blooming age leads to development of numerous water sprouts (sucker shoots), which cause much additional pruning work, and if left unattended, most often ruin an otherwise shapely tree.

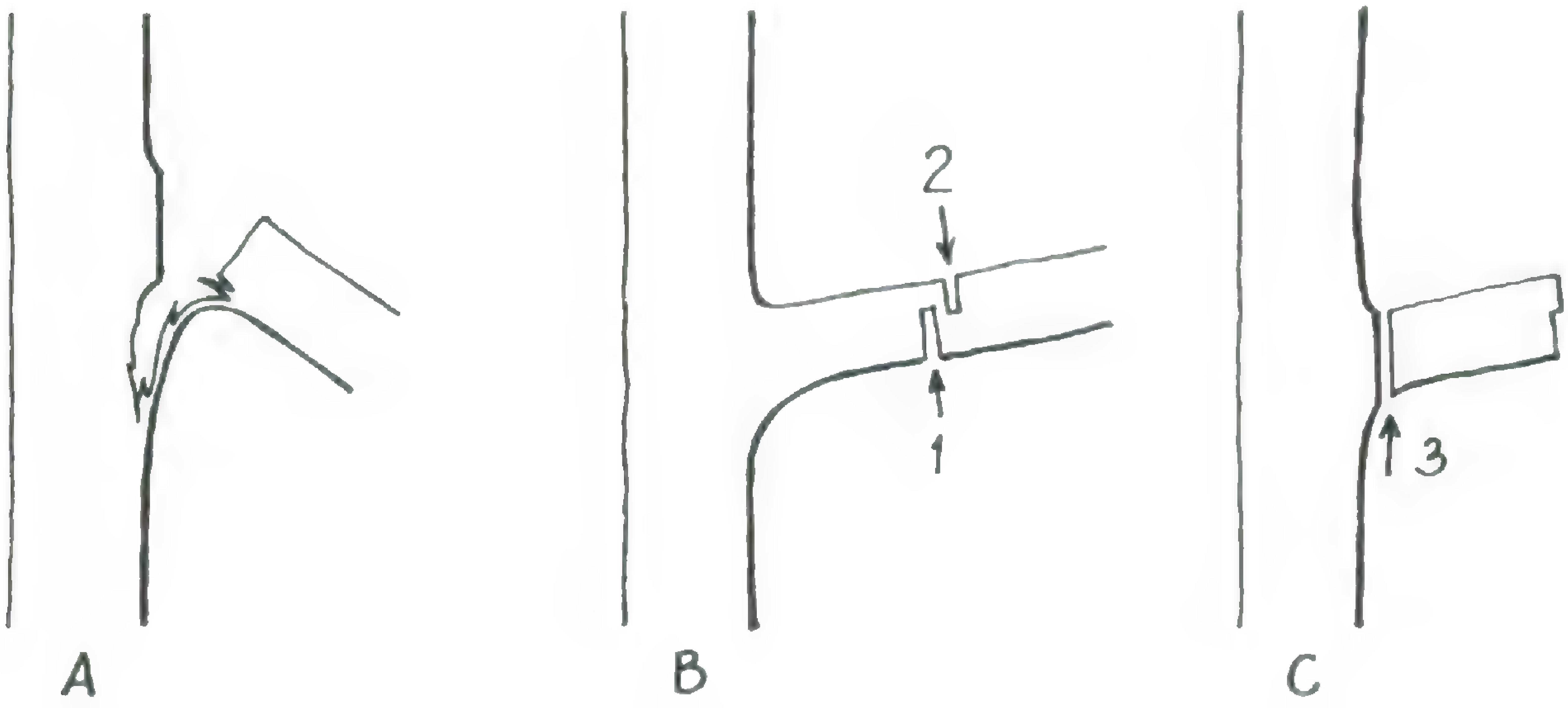
## The Pruning Cut

In all pruning, successful healing of the wounds resulting from the removal of limbs is directly related to the craftsmanship practiced in making the pruning cut. Healing or callousing of the wound is a function of the cambium layer (the thin pale inner bark), and occurs quite rapidly on healthy plants when smooth cuts are made, as when a sharp shear or fine-toothed saw is used. Because the cambium has its greatest activity in the direction of the length of the shoot or branch, the gardener will observe that the sides of the pruning cut will heal faster than the top or bottom, and elongated wounds will heal faster than more rounded wounds. Also, for this reason, the cambium fails to heal over stub ends of branches when the pruning cut is made too far from the trunk or remaining limb.

Removal of large limbs presents a special problem in pruning, and the gardener will do well to follow a technique commonly practiced by most professional tree surgeons. Large limbs, because of their weight and



Three principal types of branches to remove in good tree pruning to insure strong shapely trees. A. Remove limbs that have growth directly into interior of crown. B. Remove limbs that rub and chafe another limb or show possibility to do so in later years. C. Remove secondary leader, also limbs that form narrow "V" crotch. Observe A. and B. in shrub pruning also.



To remove large limbs from trees. A. Shows incorrect procedure. Initial cut from top and close to trunk usually results in tearing bark from trunk. It is advised to remove limb with three cuts indicated in B. and C.

length, exert a great pressure at the point of union with the trunk or larger limb. An attempt to remove such a limb with a single cut close to the trunk will invariably result in the limb breaking loose and tearing away bark immediately below, before the cut is completed, thus greatly increasing the area of the wound. Limbs more than one inch in diameter are best removed in several steps. First, the outer third of the limb is removed with lopping shears or saw. Next, two consecutive cuts are made near the trunk. These may be about four to six inches from the trunk for limbs one inch in diameter, and proportionately further out for larger limbs. The first of these cuts is made on the underside of the limb and through at least one-fourth of the diameter. The second cut is made on the top of the limb and slightly further out, away from the trunk. The pruner continues to saw this cut until the limb falls free, which it will do without tearing bark.

The remaining stub, now greatly reduced in weight, can be sawed away, making the cut from the top and as close as possible to the trunk. In this manner the gardener will experience slight, if any, tearing of the bark. The wound, of course, is painted immediately.

## RECOMMENDED READING

*Pruning Handbook, Brooklyn Botanic Garden, 1000 Washington Ave., Brooklyn, N. Y. 10025, May 1966.

The Pruning Manual, Everett P. Christopher, Macmillan 1954.

*Sunset Pruning Handbook, Roy L. Hudson, 1966.

*Pruning Shade Trees and repairing their injuries. Home & Garden Bulletin No. 83, USDA, 1962. Gov. Printing Office.

*Shade Tree Pruning, A. Robert Thompson, National Park Service. Tree Preservation Bulletin No. 4. 1961.

The items bearing an asterisk in the
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# MISSOURI BOTANICAL GARDEN
# *Bulletin*

May, 1967
Volume LV
Number 5

## CONSERVATION, ECOLOGY, AND THE MERAMEC BASIN

## FOREWORD

For over a century the Garden has become increasingly interested in the Meramec River system, its problems and possibilities. This BULLETIN presents two radically different points of view about plans for the river's development and two background essays by members of the Garden's staff.

Our Director, David Gates, spells out the impelling need for basic scientific investigation of how plants and animals and man can and cannot live together effectively and with the non-living world around them.

Assessments of the Meramec Basin program are presented by (1) Leonard Hall of Possum Trot, widely respected as writer and lecturer, (2) Kenneth A. Poos of the Science Department at University City High School, member of a family that for four generations has explored the Meramec and other Ozark rivers.

Finally Edgar Anderson (who with his students has long been studying the Meramec country) outline's Man's changing role in the lower Meramec valley.

Cover: Early Summer in the Ozark Uplands.

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# Missouri Botanical Garden Bulletin

Vol. LV No. 5 May 1967

## CONSERVATION AND UNDERSTANDING

DAVID M. GATES

The tempers and tempests of conservation have surged across the matter of saving the landscape from the pressures of an exploding population. It is self evident that certain representative large tracts of native habitat must be preserved and protected against encroachment and exploitation by man. Much less self evident are the reasons for setting aside large reserves. Many people of the Christian world operate with the doctrine that nature serves man; that nature and native habitats are for man's use; and they do not look on man as a part of nature. This immediately forces the issue concerning the reasons for setting aside natural reserves; it is a reason of use. The matter of use means different things to different people. To many, a piece of native landscape is for floating, or camping; motor boating or hiking; sailing or horseback riding; swimming or picnicking. To some it is a place where rare birds, animals or plants are found, or a remarkable geological or topographical feature of the earth's surface.

Conservation, the idea of having plants and animals, of pieces of the landscape, is a tangible and emotional experience in which the consequences of our action are seen before us and are walked upon and touched as we reach out. Less tangible but enormously essential to all of mankind is the use of the landscape for understanding the natural history of the planet earth. How many of us realize that unless something is done soon, future generations may be denied forever the opportunity to understand the evolutionary and ecological genesis of the planet on which we live? We have been denied by our own actions and by the actions of those who preceded us, the opportunity to understand many things concerning our natural environment, of our changing environment, or of the immediate past history of the earth's surface. Without history and without an understanding of the physical and biological evolution of the world around us mankind is susceptible to the catastrophic impact of his actions on his own habitat.

Man is an intimate part of nature, not one who is above or removed from nature nor designed to exploit and use nature, but man and nature are one and the same thing. Who among us would advise that we build a bridge across the Mississippi without employing the engineer who understands the principles of bridge construction? Someone did just this many years ago at Tacoma, Washington, and the bridge collapsed in a high wind. Who among us would deny that we must understand and give attention to every last detail in the construction of a jet aircraft for safe passage? Yet someone made just this mistake a decade ago when the British Comets (pioneering jet passenger travel) exploded in flight. Then why must we persist, as a civilized, modern nation, to live and expand and to involve ourselves more and more critically with our environment without a strong program to understand the world in which we live? By understanding I do not mean simply to describe the physical and living world around us, but describing it is the first step in the process of understanding. We are currently collecting and recording the organisms from the world's habitats at a reasonable rate, but the rate must increase, particularly for tropical regions. However, our efforts to understand the intricacies of the natural habitats of the world are shocking little at a time when man's need for this understanding is becoming desperate.

It is a fine thing to conserve natural habitats—the Grand Canyon, the Redwoods, the native prairie, the Great Smokies and many others—but in addition we must marshal our forces for understanding them. The collecting of knowledge and the pursuit of understanding is not as tangible as redwoods, rivers, mountains and canyons, but it is every bit as essential. All the saving of natural habitats will be to little avail if we do not strive for a vigorous program in the pursuit of knowledge. If we do not understand the natural history of the earth, mankind will be threatened with a running down of the environmental mainspring—a life of ever increasing degeneracy; of an overcrowded, polluted and plundered planet containing only small remnants of its former natural beauties, and these badly disturbed. While we are vastly improving our technology, our communications, our bridge building, our transportation, our ability to explore space, the planetary system, and the galaxies, we are letting slip through our grasp the single most critical opportunity mankind will ever have—the opportunity to understand the natural history of the earth. We will be starry eyed and impressed with our own technological achievements in the vastness of space and the intimacies of the atomic nucleus while we lose forever the opportunity to consciously and intelligently plan the future of mankind as an intimate, dynamic part of nature. Mankind cannot afford to continue its attitude toward natural history, of understanding too little and too late.

As a nation we are strong in scientific research and in becoming strong we have made conscious decisions at high government levels concerning research programs. We have decided repeatedly to emphasize nuclear physics and in so doing we are building great nuclear research centers such as the new commitment for a $350 million nuclear accelerator at Weston, Illinois. We build the world's finest astronomical observatories, solar telescopes and radio telescopes costing hundreds of millions of dollars. We launch great oceanographic ships to explore the oceans of the world. We put dozens of satellites into orbit to measure and probe the geophysical environment

Meremac River below the dam
at Meramec State Park.

Photo courtesy Meramec Basin Association

of the earth or to look down at the global weather. These things should be done and in so doing will pay handsome dividends to mankind from the knowledge they accrue. Yet it will be possible to study the atomic nucleus, the sun, the planets or the galaxy a hundred or five hundred years from now. But not so the natural history of the earth, especially the natural habitats of the land masses, the terrestrial ecosystems. The woods, prairies, deserts, chaparral, streams, bogs, swamps, estuaries, and lakes of the land are susceptible to rapid and almost instant change. They are abruptly wiped out by the blade of the bulldozer; they are poisoned by pollution; they are destroyed by man-made changes of climate; they are sprayed with insecticides and herbicides; and they are invaded by weedy plants, by pernicious animals, and by man himself. Every terrestrial ecosystem we know is undergoing rapid change or is under the threat of rapid change by the hand of man. With the change goes forever the irretrievable opportunity of understanding the natural history of the earth.

We do not understand the detailed relationships of plants, animals, and environment within any single ecosystem. An ecosystem is a single community of plants and animals such as a forest, a grassland or a bog, where the boundaries can be more or less specified. Scientists have described the plants and animals and the climate of many ecosystems and have achieved some understanding of food chains, population relationships, and climatic effects. Yet we understand very little of how the simplest ecosystem works; the complexity of the simplest of natural communities is enormous. Modern science has the capacity to work out the causal relationships within an ecosystem for a basic understanding. There is not a subject in science more diverse and difficult than the complexity of an ecosystem. Its understanding involves meteorology, climatology, geology, soils physics and chemistry, physiology, plant and animal anatomy, morphology, taxonomy and systematics, biochemistry, genetics, population dynamics, sociology, behavioral science, mathematics, and others. This is the basis of the difficulty which exists within ecology as an intellectual discipline.

Why must we persist in doing those things that are easiest; of putting our national resources and manpower, our intellects and cleverness, to work on those things which are tangible engineering achievements without buckling down to understanding the world in which we live? While we *save* a redwood forest let us also marshal our forces to *understand* it. Why do the redwoods grow where they do; to the immense size they assume; what is the secret of their longevity of 4000 years; how do they transport water 300 feet straight up? When we save the sand dunes of Indiana let us understand the unique quality of the ammophila grass which clothes them and protects them against blowing away in the wind. Why were the great plains of Kansas so productive of bison and antelope and less so of cultivated plants and animals? Why and how do salmon navigate to return to their breeding grounds up the great rivers of the Pacific northwest after foraging for a thousand miles at sea?

We do not understand with any precision how it is when the rains fall on the land the water is taken up by the plants, breathed back into the atmosphere allowing only a fraction to run into the rivers. Yet water is our most essential resource and our very survival depends upon knowing how plants use it and pass it on. Why do sycamores and cottonwoods grow in the Meramec flood plain and oaks and cedars on the bluffs above? We do not really know. Must we know? Indeed to live among the oaks and sycamores, cedars and cottonwoods, to walk amidst them, to breathe the same air they breathe, to drink the same water, to depend upon them in every intimate way and upon the millions of plant relations, we must understand them.

In some way we must get across to the leaders of this great country of ours the absolute necessity for greatly increased attention towards understanding the living complexities of the habitat in which we live—a crash program to train young people in ecology, in the dynamics of the living landscape, with a capacity to make rational decisions concerning man's welfare. We urgently need the establishment of great centers of learning devoted to understanding the single most important thing ever given to mankind, the heritage of living things. The natural world around us is as much a part of ourselves as are our own children, or our own parents. Many people believe we are studying these things. We are; barely. Yet we need to do so with the passion and dedication with which we race for the moon. It is our lives and our children's lives and the lives of their progeny with which we are playing roulette; a game one cannot possibly win when played too long. We can only safeguard the future of mankind through understanding the natural history of the only planet upon which most of us will ever live. Help us to understand this magnificent green earth before it is too late.

## THOUGHTS ON THE MERAMEC BASIN

LEONARD HALL

One of the largest public works proposals in the Mid-west today is the plan of the Corps of Engineers for the development of the Meramec Basin. This plan has the approval of the Congress, although funds will doubtless be appropriated on a somewhat piecemeal basis, since total cost of the project may eventually exceed $300,000,000. In order that we as citizens may understand and evaluate the plan and its economic, social, and ecological effects, the first step is to look at the area.

The Meramec Basin is made up of a complex of three main streams—Meramec, Bourbeuse, and Big Rivers—together with a large number of tributaries. Among these latter are streams like Huzzah, Courtois and Indian Creek on the Meramec—Mineral Fork and Cedar Creek on Big River—and numerous smaller creeks feeding into the Bourbeuse.

The many watersheds making up the Basin embrace an area of some 2,500,000 acres or 4,000 square miles on the north escarpment of the Ozark Highland. Unlike other Ozark rivers which flow either into the Missouri on the north or White River to the south, the Meramec complex empties directly into the Mississippi, some 30 miles south of St. Louis.

Perhaps the next step in considering the development is to review its history briefly. Serious study of the Meramec Basin began in 1927 when the Corps of Engineers was pushing for flood control projects in nearly every river system of the nation. Although an initial survey came up with a negative report, by 1938 the Congress had authorized a nationwide plan that included three "high dams" in the Meramec Basin for flood control, power generation, and navigation.

Missouri conservationists correctly analyzed these dams as costly silt-catchers which would fill up completely and eventually go the way of countless other reservoirs built by the Corps without adequate planning. Thus through a determined effort they forced deferment of the plan for further study.

Meanwhile St. Louis continued to grow and its need for recreational water areas of large size became acute. Pollution in the lower stream areas became a problem. Flooding grew worse because of more intensive land use and unwise methods of timber harvest. Upstream towns throughout the Basin were suffering from declining farm income and lack of adequate water supplies. Finally as a result of demand from the area, a House Resolution was introduced by the late Congressman Clarence Cannon, authorizing a new and comprehensive study. Out of this study came, in 1964, the final recommendations of the Corps for complete development of the Basin.

This study was, incidentally, not undertaken lightly. It was participated in by the Corps of Engineers, Departments of Agriculture and Interior, Fish and Wildlife, Bureau of Outdoor Recreation, Bureau of Mines, SCS, Forest Service, Departments of Commerce and Health, Education & Welfare, Federal Power Commission, seven Missouri State agencies and the University of Missouri, and private groups including the Meramec Basin Association, and Meramec Basin Research Project.

In studying the plan finally presented by the Corps, consideration must be given such factors as population, water needs, flood control, pollution, suitability of land for agriculture, forestry and recreation. Thus we find that the Basin consists of approximately 25% farm and pasture land (some alluvial and highly productive and some marginal)—and 75% of other land types of which the majority is in National, State and privately owned forest. Much of this is in cut-over and second-growth stands today; yet it is slowly coming under better management and offers a big potential for the future in both harvestable timber and recreational opportunity.

There are a number of attractive small towns in the Basin—most of which suffer in some degree from under-employment and cannot help but benefit from the development of the rivers. Total population is approximately 200,000, a figure that is certain to increase. However, it is the proximity of St. Louis and its environs with a concentration of nearly two and a quarter million people, which makes the Basin development of such great importance. Among the factors considered in the over-all planning are: Water Supply Needs (which are growing rapidly), Water Quality Control, Flood Control, Possible Future Power, Industrial and Agricultural Development, and Recreation.

In this latter field, St. Louis is today vastly handicapped by lack of proximity to large areas of clean water ideally suited to recreation. A report of the Outdoor Recreation Resources Review Commission in 1962 stated: "If present pressure for water facilities for St. Louis recreation continues to mount, failure to act may find this city defined as an undesirable area in which to work, live and play."

There is no doubt that in the latest Corps of Engineers plan for the Meramec Basin, an entirely new approach has been made. This might be called the "over-all watershed approach" in which land use and the total needs of the people of the region are taken into consideration. In the preliminary study, 31 major reservoir sites on the main streams—and 253 headwater and tributary impoundment sites — were thoroughly investigated. The final recommendation for immediate construction calls for 4 main stream reservoirs: Meramec on the Meramec, Union on the Bourbeuse, and Pine Ford and Irondale on Big River; 3 tributary stream reservoirs; 6 headwaters reservoirs; 21 angler-use sites; and 5 local protection projects.

As one considers the pattern of land use in the Ozark Highland over the past century, it is evident that we have a potentially magnificent supply of water adequate to our needs for many years to come. At the same time, we cannot help but realize that we are losing much of this potential through erosion, siltation, pollution, flood damage, and a receding and irregular stream flow because of bad land use.

Forces are at work today both in agriculture and forestry to remedy these conditions. Yet we also know that even if the original stream conditions could be achieved, this water area offers but a small recreational resource in the number of people it can accommodate. The same is true of the supply of clean water for domestic and industrial use in the area, while water for agricultural purposes such as irrigation simply does not exist.

There is little doubt that a development project of this magnitude is going to upset Nature in some of its aspects—but the truth is that man has already done this in the Meramec Basin for a hundred years, mainly through poor land-use. It is equally true that the contemplated reservoirs will cover some arable farm land, although on the upper reaches of these mountain streams, this is minimal. Lower reaches of some of the smaller and more beautiful free-flowing streams will be flooded—the Courtois and Huzzah, Indian Creek, and Mineral Fork, for example. Yet it can hardly be said that any of these today support much recreation or can stand much pressure on their game fish populations.

There are also a few who still claim that the Basin as a whole will suffer ecological upsets which may be harmful. But here again, analysis would indicate a better relationship between man and his environment; a vast gain in the fish potential and very probably a similar gain for wildlife; an improvement in the quality, quantity and regulation of water. All of these represent a gain for the people of the Meramec Basin, of St. Louis and of the surrounding states.

Like many other outdoor folk, I would prefer to keep the Ozarks as a wilderness, with free-flowing and unpolluted streams full of bass and panfish. I would like to see much of the region kept as a refuge for wildlife. But these conditions do not exist in the Meramec Basin today—and they will not exist there again under any possible pattern of man's use. And yet—thinking the matter over—I'm not so sure but what I prefer here an area which millions of Americans can use and enjoy and where they can recreate today and in the years to come. This being the case, I will continue to back development of the Meramec Basin for all the people.

# WHO IS THE KEEPER OF THE RIVER?

KENNETH A. POOS

WHAT is there about a river that wants to be dammed? Are dams a panacea for all rivers? The Meramec is our beloved river; it an ancient place and we have loved it anciently. We must question closely the plan contemplated for our river. Many times the questions will be better than the answer that we get.

How do you calculate a river? For four generations my family have been "river folks." We have a best way for calculation; we measured its beauty. There is a danger in knowing a river so long and so well. There is the danger of loving it too much, in chancing to be hurt as the river is hurt, unwittingly or by calculation. The problem we have with our units of measurement is that we can't explain them very well to strangers. Our units must be based on information taken on the river. They must be used the same way. Our units cannot be handled with precision and fed into a computer. Can feeling be programmed?

The heart has reasons the mind cannot know: "acre feet," "cubic feet," and "average flow" we understand, but we do not love. We do not see the Meramec, our river, in the compilation of these things. The river to us is sense data fed into our minds. How can we trust anything less?

It was March this year when we returned to our "sanctuary." It is a magnificent shelter by the river. The entrance to Green's Cave is lofty and the grotto carved perfectly out of stone. How long did it take to build? From one side of the big room comes the cave-stream singing its endless, cool, brook-song as it finds it way down to the Meramec. The day is misty and cold. The warmth of the oak fire feels good. Periodic rain on the river makes expanding circles and is pleasant to watch from our shelter. The arch of the entrance is beautiful, even against the gray sky. Last Spring a spray of Shooting Stars grew and bloomed just there in the center, at the top, to become the crowning jewels. How appropriate; who was the planner?

A leopard frog in the cave stream has found the comparative warmth of the water, and a small food supply, and has decided to stay awake through the winter. He must like this place too! The liverwort Marchantia is green and alive in the flowing spring-water and has formed gemma cups already. A few inches above the water, the frost has browned those plants beyond the water's warmth. Living space for Marchantia in this unique microclimate is defined by the boundary of the brook and about four inches up from the water. How delicate is the balance of the heat budget for Marchantia! If we return later we will see lovely little archegonia like tiny, nine-lobed umbrellas, held aloft on tender, elongated stalks. In the sandstone grow miniature, chance-planted junipers, barely six inches tall. Tucked into a crevice is the delicate "walking fern," looking not much like a fern at all, but more like an elongated heart, cleaving to the damp, north-facing bluff, loving cool more than hot. Close by too, is the Christmas fern, very green, growing here where it never receives the direct light of the sun; the seep water and minerals of the bluff sustain its life.

The pixie-cup cladonia lichen has fastened itself firmly to the large blocks of sandstone, penetrating the spaces between the quartz granules. Lilliputian pixie cups seem to be growing in communities. One appears to be blooming! How can this be in a plant without flowers? We look closer and a fuzzy red spider gets out of the cup where it has been curled up, and walks away. Who taught the spider about pixie cups and mimicry? Who made the cup or the spider the right size? Here where the river has meandered against the south bank to entrench itself, is a very special place for these plants. Sphagnum moss, a patch perhaps one hundred square feet in area, lives here. How tenuous a hold on life, storing water in its dead cells to tide it over the drier times of year!

It has been a day of peace. Very satisfying. We must leave now. The canoe slips easily into the heavy river-bottom mist. These are the Ides of March. Suddenly there is a far-away sound calling to us. From deep in the cave mouth comes an eerie voice. It is a "hooty owl!" He speaks to us four times. Whooo? Whooo? Whooo Whooo-oo? Then there is silence. The owl has spoken as if to ask us questions.

A huge brushpile has accumulated on a gravel-bar. It is a kaleidoscope of human trash. There are plastic bottles, light bulbs, an old stove, and rubber tires. The tires are so incongruous! How do they find their way to the river? You'd think common sense would deposit them somewhere else, but common sense isn't common any more. The peace and satisfaction of the day are gone now. Two wood ducks get up ahead and take off over the tree tops. Their silhouette is a picture. How can beauty live side by side with ugliness? Who made the river-bank ugly here? Is that what the owl was asking? Whooo? Whooo? is the keeper of the river?

I am given to understand that the Meramec is going to be dammed. Do dam builders love the Meramec? Are they Missourians? Do they really have a conscience about the river? How can we know?

Look to see what the dam builders have done to another river we have loved. "The Black River is beautiful." My father told me this. He is gone now, but I believed him. He floated its waters many times. He spoke of the beautiful crystal clear water and the magnificent tall bluffs. How does this river look today? See the headwaters of the Clearwater Reservoir and know. The high-water mark is more than thirty feet above normal stage. Can our Missouri plants live under water for a time and survive? What will happen to the great Meramec grottoes? Jackstraw timber is heaped in great disarray at the high-water mark, looking like a pile of bleached bones. The earth has slumped away from the sides of the hills into the water, leaving scars where nothing grows on the red clay. Talus slopes are everyplace along

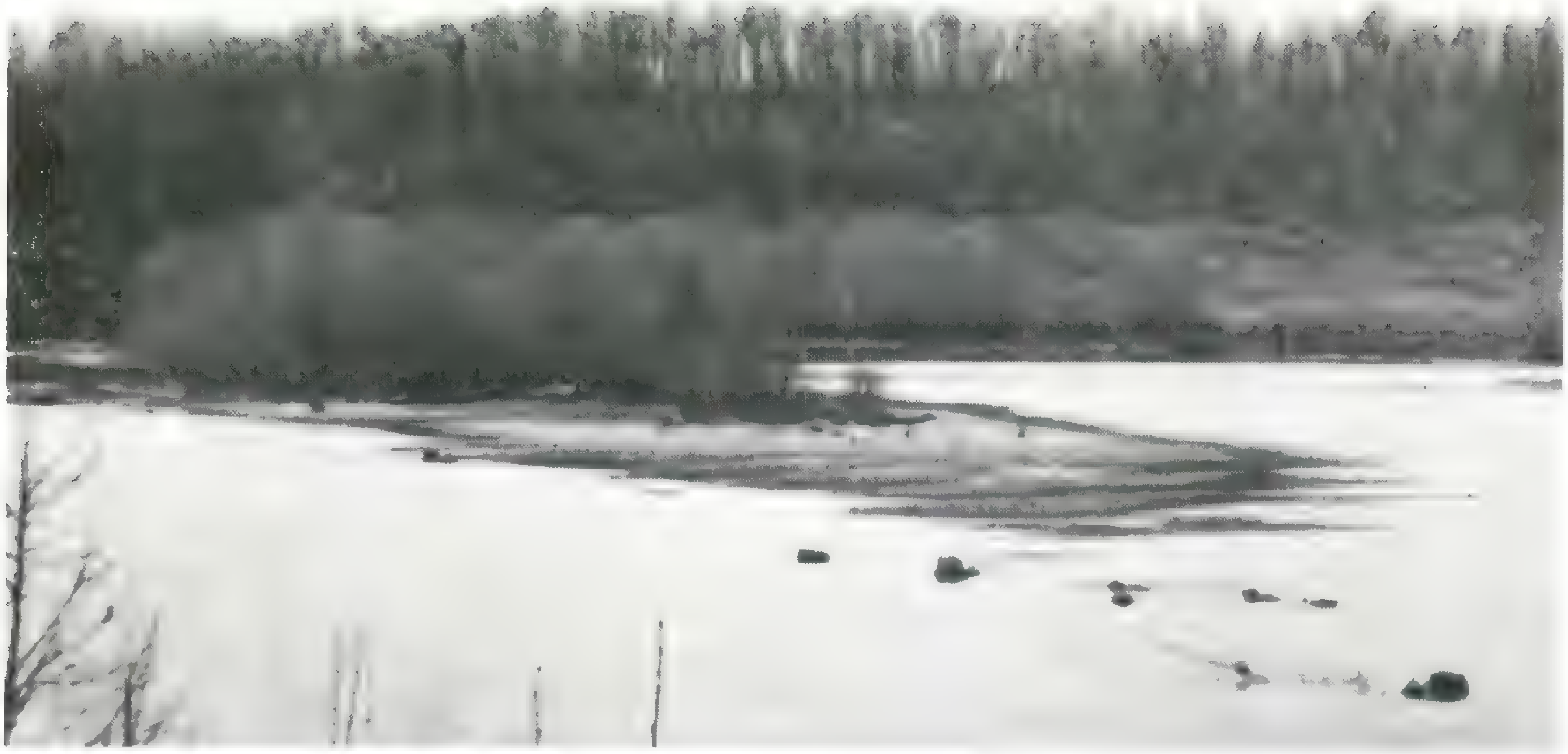


Photo courtesy of K. A. Poos

Stumps and mudflats at Clearwater Reservoir where the river drops its load. The channel is lost under a blanket of soft silt. Will the flowering water-plants grow here? There is no evidence that they do. (See page 9.)

the shore. The zone between high and low water-levels is missing the plants that should grow there. What happened to the ferns? There is an occasional young sycamore that has made a go of it in the loose talus near high-water mark. Smilax, the cat-briar, grows here in places. This zone is essentially barren of plants. It is a strange place. Not even the lichens can make a foothold in this man-made habitat.

If we are to have this dam on the Meramec and it turns out like the Clearwater Reservoir must we build it on the best stretch of river? Do we have to give up the floatable sections of the Huzzah and Courtois rivers? Is it necessary to give up the springs and caves and the botanical record of the upper Meramec with so many kinds of plants rare or unknown elsewhere? Will this lake be close enough to St. Louis so that people from the central city can afford to use it, or will we select against these people that need it most by placing it farther away? Who cares to riot when he can go fishing? How can we apply one set of criteria to the beauty of the Current River and reverse that thinking on the upper Meramec?

It is conceivable that a planner with a conscience could make it possible to keep the botanical treasures and the free-flowing sections of the Huzzah and Courtois. Isn't this the time to acquire additional public lands for the future instead of flooding a wildlife area? Isn't this the time to make the decision to keep some of our cherished heritage? Do we have a viable philosophy toward conservation in this state or do we collect fees and look on everything in nature as a crop to be harvested for Man's pleasure? Have we proceeded beyond sloganism in conservation?

We have been Missourians for a long time. We do not take our heritage lightly. We are not now ready to retreat to another river because some-body from afar tells *us*, who know best, how to put the Meramec to use. Commercialism cannot be our conscience in this matter. We can not approve a plan that gives the franchise to some and disfranchises others. The use of the Meramec can be a credit to the state or it can make dollars for some and rubbish piles for others. Can we plan the use of our resources so that our grandchildren will be able to see what Missouri used to be like or will they see it only in a museum? Will the upper Meramec be free-flowing, clean and clear, with flora and fauna intact? The time for saving them is short! We will need courage to say NO when necessary. There will be pressures brought to bear. Some will shrink from the task. Have we got the leadership and the will to prevail? If we fail at this business, archæologists of the future may well look into our rivers and conclude that this was only the AGE OF BROKEN GLASS. Who is the keeper of the River?

# THE LANDSCAPE OF THE LOWER MERAMEC AND ITS TRIBUTARIES

EDGAR ANDERSON

IN ITS winding course from Gray Summit to the Mississippi, the Meramec river valley has outstanding geographical, botanical and historical features. Persons now interested in the valley's future are frequently aware of some of these but not of others. Yet all of them may have to be reckoned with. In planning for the valley's future, narrowly trained engineers, foresters, and recreation experts are inefficient. Until they begin to comprehend the inter-meshings of these three aspects of the total problem with their own concerns, those without such understanding may have disastrous effects upon the landscape for decades—or centuries.

Up to thirty years ago the upper terraces of the Meramec Valley were conspicuous from Eureka to Fenton. Nowadays, those who study earnestly the evidence still available can learn much from it. Until the 1930's, it was so conspicuous that it thrust itself upon one's attention. The lower terrace is usually under water several times a year. Cornfields overnight besome interesting places to go canoeing. Fewer remnants of the upper terrace had then been destroyed or greatly altered. They are seldom under water and then only briefly.

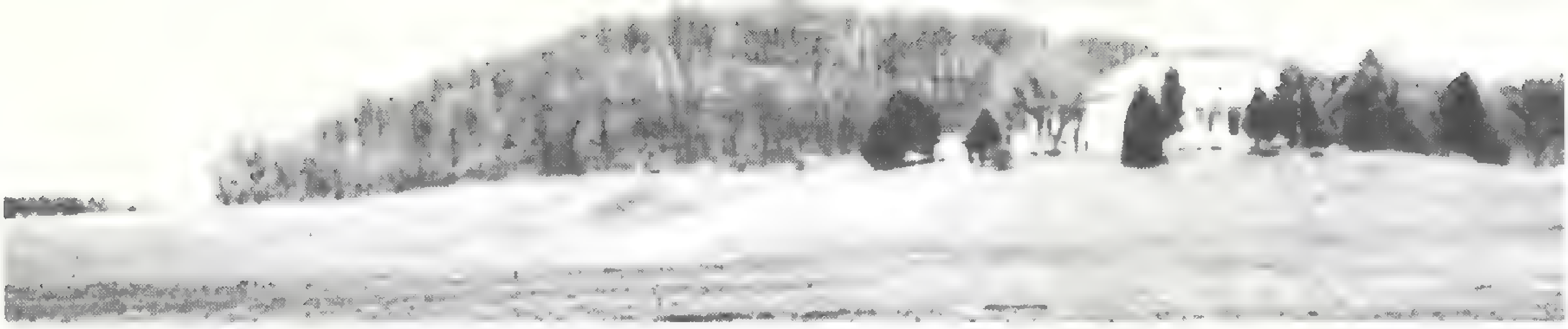
The upper terrace had been the river's flood-plain until shortly after the last glacial period when the valley's height with reference to the Gulf of Mexico, shifted rapidly upward and the river began chewing its way down to its present level. In the 1920's there were engaging souvenirs of the uses to which early white settlers had put the remnants of the upper terrace. Driving out to Fenton in flood time, one noted the Vogelgesang family's house and farmyard perched high and dry, nicely out of the *überschwemmungsgebiet* (over-flooding-area) to use the precise German word for the active floodplain of a river.

As one gradually became familiar with the extent of the two terraces, he came to realize their even greater importance to man before the first pioneers arrived. He learned to trace the little brooks (bankfull in springtime, fairly damp in the driest parts of most summers) back through valley woodlands to the point at which the upward slope increased rapidly. There, if he was lucky, was a little terraced area nearly as flat as a table top, but not so dramatically horizontal as the isolated terraces of the lower floodplain. Some were no bigger than a good-sized drawing room, others larger than a generous home garden. Some of the larger ones had been used as picnic spots during the century since the region was actively settled. To those who appreciated what they saw, there was evidence of previous use by prehistoric peoples. They were likely places for arrowheads, even though other collectors had been there before you. My sharp-eyed assistant, Leslie Hubricht, searched one such site carefully whenever we had a hard rain; on it and close by, in a few years he accumulated a peck-basket of perfect or near-perfect arrowheads and scrapers.

Where they had not been too heavily pastured and gullied, these remnants had the most fertile soil in the valley, the richest mantle of wild flowers in early spring. Some trees, such as the Kentucky coffee-tree, are characteristic of them, though scattered elsewhere as well. From Gray Summit to Pacific the only specimens I have seen of the Shumard (Leopard) Oak and of the king-nut *(Carya laciniosa)* were on upper terraces. The latter a giant among hickories, is even more spectacular after it has been shelled. Like a pecan, the husk thins out toward the tip. There is a longer nut inside than one suspected, roughly the width of a good-sized hickory nut but almost twice the length.

Extensive stretches of upper terrace were cleared early and became the chief farmlands in the Meramec valley. Originally they had rich forests of many kinds of trees, among them black walnuts of a size no longer seen. The ancient log cabin owned by the Garden is constructed of large, squared-off black-walnut timbers which could not be duplicated today.

This fragment of "upper terrace" at the Garden's Arboretum has been a favorite camping spot since prehistoric times. (See above.) Photo McBryde



In the valley of the Meramec near Fenton, Missouri, an old farmhouse rises safely up out of the floodplain, secure from ordinary floods on its upper terrace. (See p. 11.)
Photo McBryde

The speed with which young woodlands appear when fields or pastures on river terraces are let alone, has to be experienced to be believed. Growth there is lush. From May to mid-September our flood-plain woodlands are extensions of the sub-tropics, hot, humid, partially wind-protected. Much top soil is fertile but with lenses of sand and gravel below. The river seeds in lusty quick-growing upstarts—cottonwood, boxelder, sycamore, ash, silver maple, river birch—along the river bank. These are not important timber trees, but they are beginning to be treated as a crop in parts of Missouri. Properly managed, they produce an astounding tonnage of molecules per man hour per acre that modern technology is finding uses for. At the best it could be a managed crop, harvested and replanted every few decades.

By contrast, hilltop woodlands change slowly. Lusty trees may come up but they die (or die back) in drought summers. Along the ridge at the Garden's Arboretum, spindling white ashes are taller than thirty years ago but not noticeably bigger around, even though others have died out in between and they are now farther apart. Those who design plantings for recreational areas should be warned about these extreme differences between valleys and uplands in tree growth.

Upstream from Gray Summit, the main trend of the Meramec valley is north–south instead of east–west and the valley is much narrower, more of the size one expects in so small a river. Apparently during part of the glacial period, from Gray Summit down-river it carried the Missouri River's heavy load of glacial silt all the way to the Mississippi; up-river from Gray Summit, and up such tributaries as the Big river, remnants of the upper terrace fit their local name, "the upper bench."

From Fenton, downstream to its junction with the Mississippi, the Meramec valley is subtly different botanically and in other ways. It may be that Fenton often is a critical point when floodwaters back up into the Meramec floodplain. Sometimes a succession of floods from different places upstream held water there for long periods during the growing season. Only plants such as those characteristic of the flood plain south of Cairo (evolved during millennia of such treatment) would feel at home there. The swamp privet, *Forestiera acuminata,* is a good example. Its bright yellow blossoms used to be so conspicuous in early spring from the old bridge at Fenton, that you noted them driving by, but the species was not noticeable much farther up-river. It is a tall shrub with long, slender, gray branches. Its flowers are brighter and larger than those of the spice bush (which blooms at the same time so that they are sometimes confused).

My first trip to the Lower Meramec in 1923 was made with the Garden's

A flowering branch of Swamp Privet in the early spring. (See page 13.)

Photo McBryde

veteran plant collector, John Kellogg. In those days one could still see one picturesque remnant of the old grove of pecan trees which he remembered from earlier times. It is now becoming generally agreed that these groves of pecans in the Mississippi, and its extensions, date back to the mound-builders, though no one has yet made a critical review of all the evidence to determine how much of the distribution of the pecan in pre-white times resulted from human assistance. Evidence is now accumulating that high culture civilizations lived in populous communities along the Mississippi at the same time that far more primitive cultures were established in woodland areas not many miles away. There were apparent mounds not far from the Meramec's mouth. It might be that the messy look of the vegetation down-river from Fenton was partly the result of ancient cultivation followed by centuries of abandonment. It had that jungly look of having run wild from intensive cultivation that I have noted in the Old World and in Latin America.

Next to the river valley itself, the most outstanding landscape features of the lower Meramec come from the capping of the soft St. Peters sandstone by a thin layer of the extremely hard and durable Joachim limestone (pronounced "Squashum" or "Washum" locally through folk entymology). With this thin, hard cap above very soft sandstone, exposures form almost vertical cliffs. After all the geological ages it has lain there, the cap is still flat and level, producing the Crystal escarpment. It was in the late twenties and mostly on foot that I helped study its relation to the flora of the region. With the aid of a detailed report *(The Sand and Gravel Resources of Missouri)*, we traced its involved convolutions from Crystal City on the Mississippi, to where it crosses the Meramec river at Pacific, Missouri. As the years went on, I continued to visit the region as it gradually became accessible to a station-wagon large enough for a small class of students. As late as 1928 there were still places (as near Sandy Creek Church) where the winding, smooth surface of the Joachim limestone served, for a mile or two, as the community's only all-weather road. I must admit that only cautious driving saved the station-wagon's brakes and that (the extremes of relief being around 500 feet) only the stout-hearted really enjoyed riding on the side looking down over the cliff.

Spectacular cliffs, dominating the surrounding landscape, are not the most characteristic features of the Crystal escarpment since they differ only in detail from cliffs found through much of the Ozark country. It is rather the narrow canyons hidden back in the woods, difficult of access and known to relatively few people, that mark the St. Peter's country. The tough thin cap on the crumbling sandstone requires only a tiny stream to produce a shady canyon. Sometimes there are patches of soil that are as sandy and as sparsely clothed with plants as an ocean beach. They look and act like sea-sand because they *are* sea-sand from an ancient beach. On the face of the cliffs you can mine the sandstone with a jack-knife, sometimes even crumble it with your fingers.

Like many other canyons they look as if they had been carved by powerful rivers instead of the little brooks that trickle through them and dry up in the summer. The first time you visit one in a hard rain you will be astonished at the volume of water. In a real cloudburst such as only comes a few times a century, they are a place to get away from fast. I once heard one roaring in the distance and months later flood wreckage was still conspicuous there.

These unique canyons are botanical jewels; they are natural rock gardens in a pleasant woodland setting. In a well-run society they would be set aside for people to walk through and explore. They are not, like the "shut-ins" of the St. Francis Mountains, adapted to mass recreation. Picnic areas and bathing pools would require water piped in from a distance and would be ugly wreckage and a lasting eyesore after one big cloudburst.

The vegetation itself has little mass-appeal. To those with memories of a childhood or vacations in the North, it may have strong attractions. The sandy soil, the semi-shade, the moisture in the air over much of the year, have produced mats of ferns and mosses, patches of partridge berry where the sandstone is damp, tufts of delicate harebells, bright gardens of red and yellow columbine hanging out from the cliffside to reach the sun. The largest area of this sand country is in the hills lying southward from Eureka and Pacific. It was settled early. To those coming from southern uplands it was, like the country they left behind, suited to a combination of hunting and fishing and farming. The prevailingly sandy soils made it easy to clear patches, build cabins, work the soil, and let livestock range far and wide. But the sandiness of the St. Peter's sandstone was outside their experience. It produced soils low in fertility which burned out in droughts. Many places were soon abandoned and the birds planted acres of cedars in pastures and old fields. The landscape is now appealingly green with cedar foliage all through the winter.

The region long had one other outstanding characteristic. Though at the edge of Greater St. Louis, until very recently it was severely isolated by an antiquated, inadequate road system. Until after World War II, exploring the St. Peter's sandstone area required a geological survey contour map, a road map, a county map, a knowledge of the local names for certain churches and schools, and previous experience in where to go to ask questions. Today this has all changed; the area has been filling up rapidly with recreation centers, dormitory villages for industrial workers, week-end estates, adjuncts to city charities, military installations. Yet few indeed of these new arrivals know much about the whole area. It has become as un-neighborly as a big city. It can be an inconvenient place in which to live and shop without adequate motor transport. Preferably there should be someone in the family whose work schedules take him past chain stores and supermarkets at appropriate hours.

Water supplies are at a premium. It is hard to realize how difficult the problem really is until one has lived through a summer of severe drought when springs go dry, cisterns are empty and water is carted here and there by truck. At such times there is much talk about the extent to which deep wells are less dependable decade by decade. If this is not being precisely and intelligently looked into, it certainly should be.

A pleasant feature of the Crystal escarpment deserves a final comment, the watershed between the Meramac river and the Big river. Because of the hard cap on the soft sandstone, the ultimate divide between these two rivers is as jagged as many mountain ranges. Its sinuous line of little cones has a special grace when contrasted with the almost horizontal Ozark peneplane, whose level summits of distant ridges fade into each other monotonously. As far away as you can see them, these peaked hills improve the view from every hilltop.

I once had a war veteran student who took such keen delight in the tiny hills that he thought up a private name for them. Though he was a plain, practical sort of young man, one day when I was pointing them out from a distant hill and locating them on a map, he said shyly, "I have my own title for them. I call them The Circuit of the Summer Hills."

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# HENRY SHAW

## A PICTORIAL BIOGRAPHY

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Missouri Botanical Garden Bulletin

Volume LV No. 6 June 1967

The portrait of Henry Shaw at the age of 35 shows the successful young St. Louis merchant a few years before he sold out his hardware business and traveled extensively in Europe. He went back to Europe three times, and on his longest trip spent much time in the Mediterranean area, visiting both Constantinople and Egypt. Many of the pictures and other works of art, now on display in his old country home, date from this journey. The band around the picture is the inner border of the original frame.

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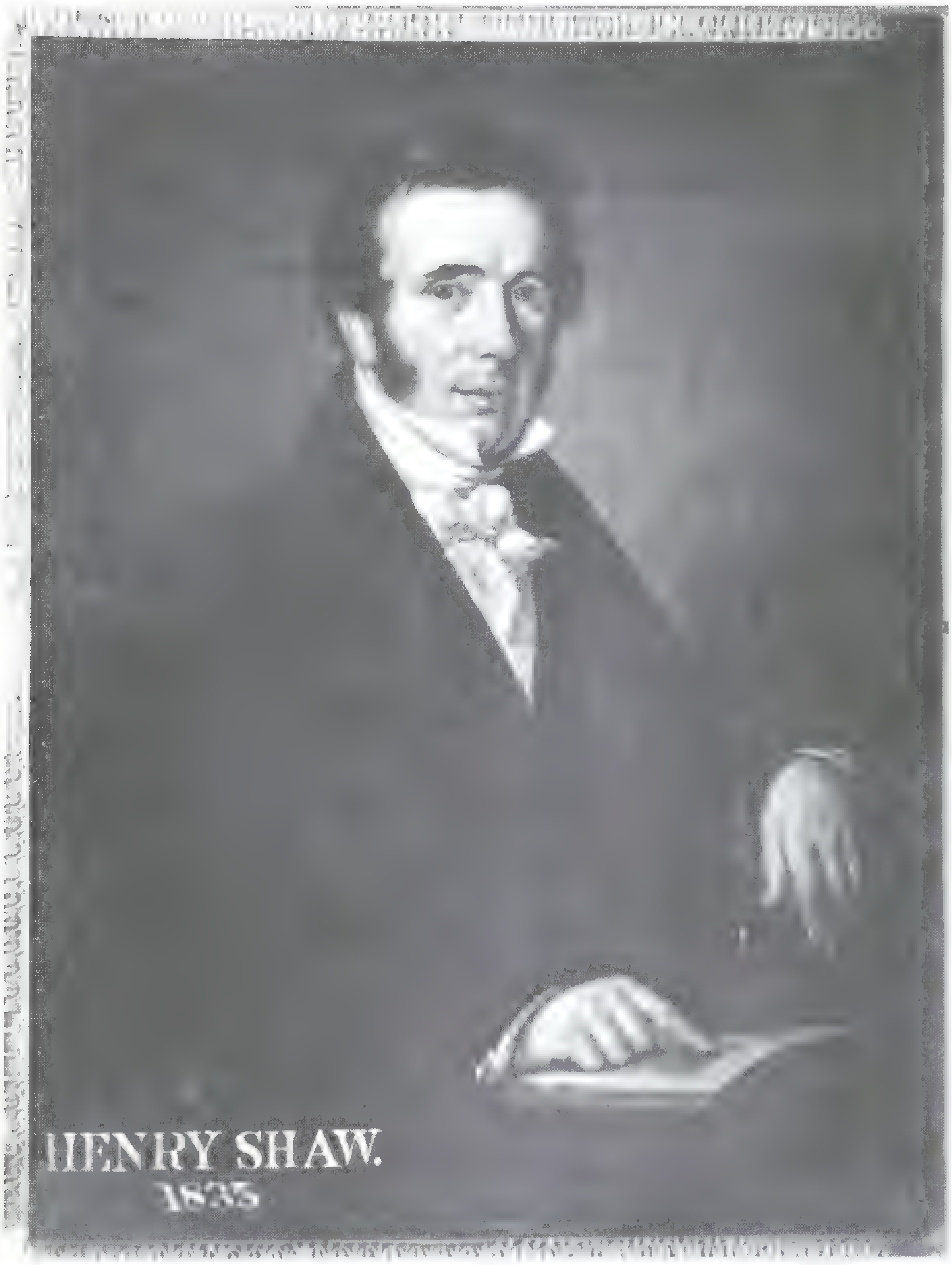
# Missouri Botanical Garden Bulletin

Vol. LV No. 6 June 1967

## HENRY SHAW
1800–1889


HENRY SHAW.
1835

Mr. Shaw's main gate as it looked during his last years. His original stones above the entrance, proclaiming that this is the MISSOURI BOTANICAL GARDEN, were incorporated in the present entrance, completed shortly before World War I.

# HENRY SHAW

## *A Pictorial Biography*

THE MISSOURI BOTANICAL GARDEN was the official name chosen by Mr. Henry Shaw, who left this garden to the public, who planned it in detail, and developed it into a going concern during his last thirty years. Henry Shaw was an Englishman, born in Sheffield, who came to St. Louis as an enterprising young merchant in 1819, becoming the city's most distinguished citizen. His death a full seventy years later was officially observed by the City of St. Louis. After an impressive public ceremony he was buried in the midst of the garden he had created.

During these seventy years he had supported his widowed mother and his sisters, had traveled widely and read even more widely (he read both French and Italian almost as easily as English). Though he retired from active business at forty years of age, he increased his income by shrewd investments. He was able to build up Tower Grove Park, to provide a School of Botany for Washington University, and to equip his botanical garden with greenhouses, gardens, a library, an arboretum and an herbarium.

He came to St. Louis just at the time when it was developing rapidly as an outfitting center for the West. He came with a little money to invest, a good training in mathematics and in languages, and from a family connected with the hardware business.

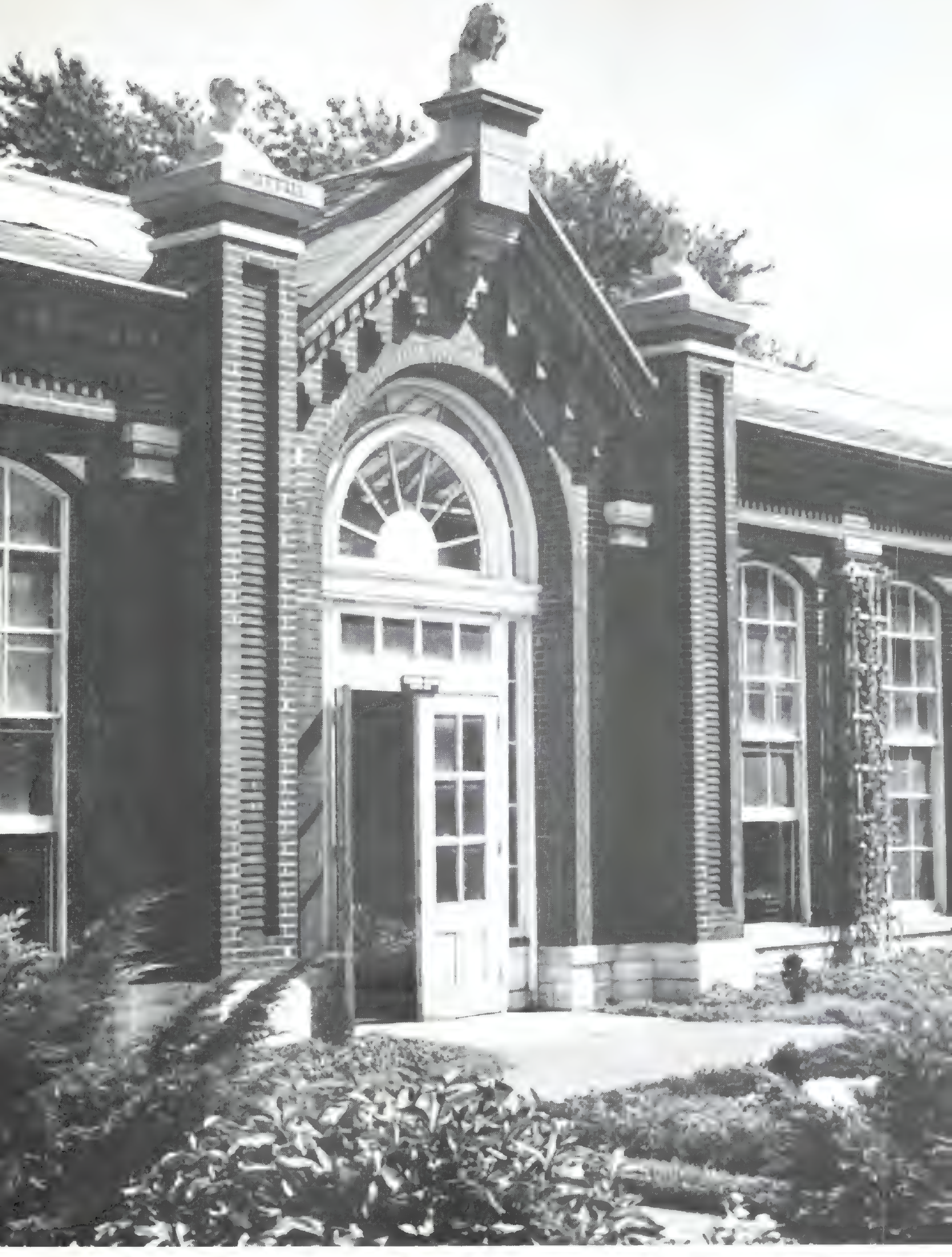


*Photo Martin Lammert III.*

The Linnaean House, built by Mr. Shaw before the days of glass and metal (or plastic and metal) construction. Probably the oldest structure of this type in continuous use west of the Mississippi and perhaps in the whole country. For many weeks each winter its flowering Camellia bushes, set off by ivy and creeping fig, is like a lovely old Southern garden.

He had studied French in school; he came by way of New Orleans; he had a natural liking for French ways and French people. He was quick to see the advantage of shipping goods up the Mississippi from New Orleans rather than by overland routes from the eastern seaboard. With his knowledge of French and his contacts with New Orleans he was able to carry out such enterprises as buying sugar at a few cents a pound in Louisiana, moving it to St. Louis and selling it advantageously when it became scarce in the Middle West. Before he was quite forty he had accumulated a fortune of a quarter of a million dollars, a large sum for those days. He then closed out his business and traveled widely. Dr. Charles Pope, the St. Louis physician, gave him an introduction to Dr. Hooker, the Director of the Royal Botanic Garden at Kew. In all, he made three trips to Europe, one of them of several years.

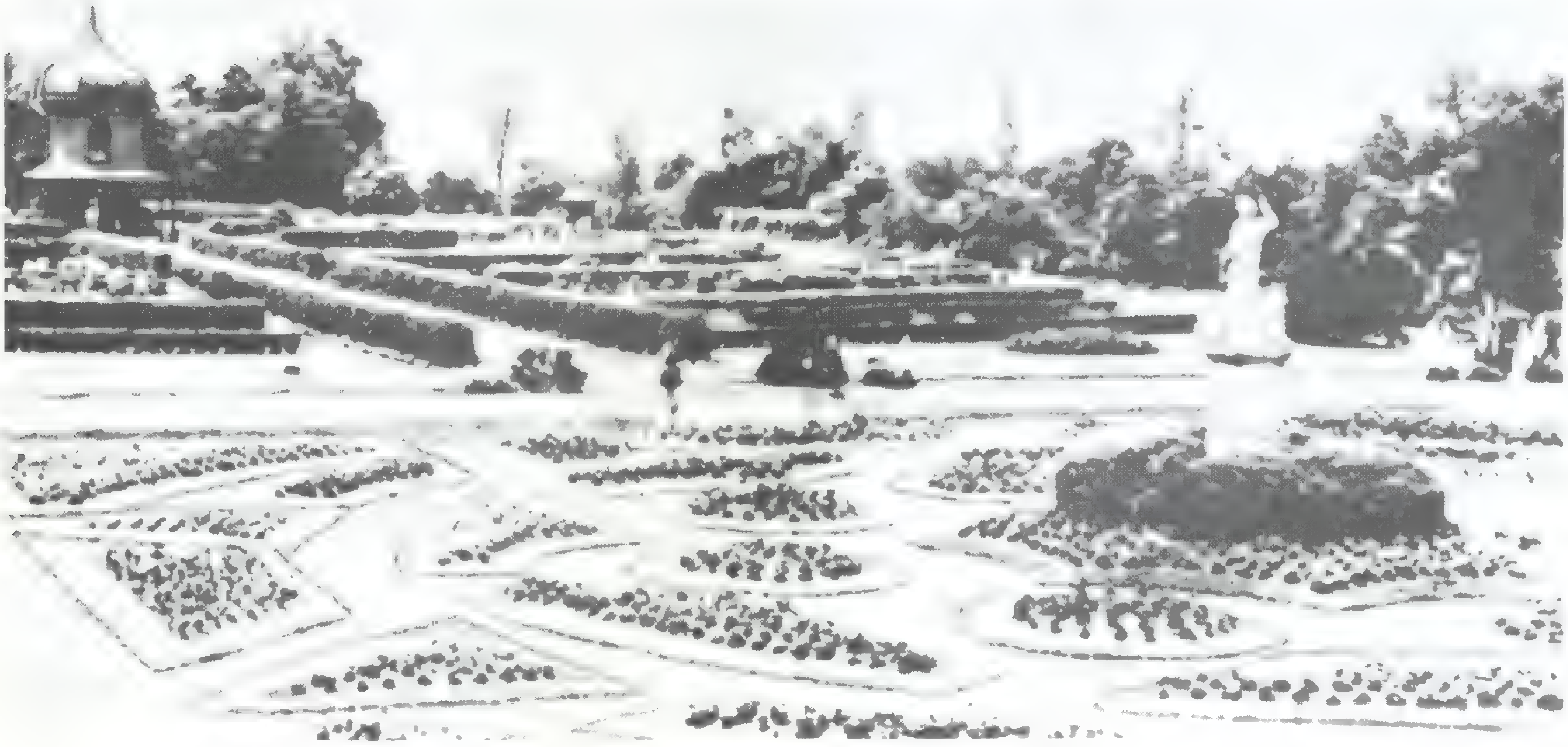
He returned to St. Louis for the last time in 1851. His country home, TOWER GROVE, had by then been completed and his city home was well under way. By this time he had formed the idea of leaving his estate to the public. His close friend, Dr. George Engelmann, convinced him that it should be a real botanical garden with greenhouses, collections of living plants, a library, and an herbarium. Mr. Shaw took several years before making his plans definite. When Sir Joseph Hooker, the Director of Kew, came to America for a long trip to the West, Dr. Engelmann had him alerted to the situation in St. Louis. When Sir Joseph stopped off here as the house guest of Henry Shaw he was prepared to urge upon his host the importance of a first-class botanical garden in the developing Middle West. Mr. Shaw was impressed and for the rest of his life, he labored to build up the best possible botanical garden for St. Louis.

In 1859, Henry Shaw erected the Museum, a brick and stone building (long since outgrown) as headquarters for his library and herbarium. He sent Dr. Engelmann to Europe to buy botanical books and herbarium specimens, books and specimens which today are worth many times the price then paid. He started an arboretum, he built greenhouses, one of which, the Linnaean House, is still a charming feature of the Garden. He brought Mr. James Gurney from England as superintendent and hired a curator for the library and herbarium. For thirty years he kept all accounts, made the plans and hired the workmen. If one examines his old account books, the disbursements, the payrolls, the names of the gardeners, the days and hours they worked, they are all there set out precisely and legibly in Mr. Shaw's own handwriting. Just for the money value alone this was no small gift. As business manager and director at $10,000 a year for thirty years, it was a $300,000 gift of himself. Henry Shaw not only conceived the idea of a great botanical garden; he got one going and ran it himself for a third of a century!

As the years passed he became more and more the city's leading citizen. He left the city and Tower Grove only at rare intervals, dividing his time between his city home and his estate which was then well out in the country. (How far out may be realized from a remark of Dr. Engelmann's when Mr. Shaw pressed him to become the first Director. In refusing he said that he did not wish to "live so far away from St. Louis"!) Distinguished visitors called on Mr. Shaw as a matter of course; he was a patron of the theater and knew visiting actors by name. Though not himself a musician, he was interested in music. In Tower Grove Park, which he founded, he had a fine open-air bandstand erected. On Sunday afternoons he would drive out in his elegant victoria, dressed in a high silk hat and a formal top-coat, to listen to the music which was being provided for the public. His official biographer tells us how he was once publicly serenaded by Gilmore's band, then giving its annual series of concerts in the city.

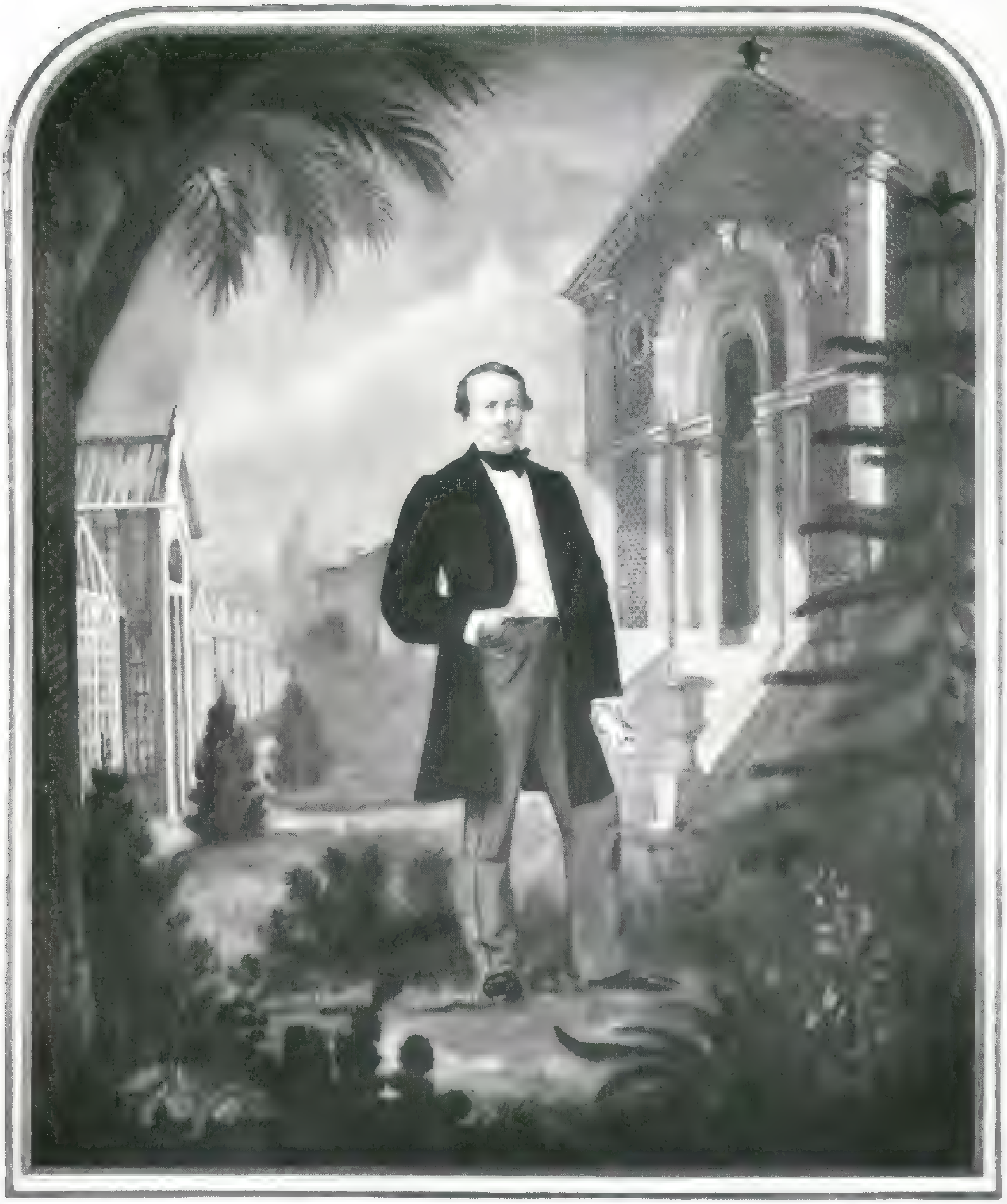
"It was a lovely October day; the foliage just beginning to assume the many-colored livery of autumn. Mr. Shaw was seated upon the lawn in front of the mansion, with a few friends about him. At proper distance were grouped the sixty-five members of that famous orchestra. As the strains of soul-inspiring music saluted the ear the venerable gentleman, his face lighted up with an expression of pleasure too deep for words."

On the fourth of May, 1879, when Mr. Shaw was a vigorous old gentleman just approaching 80, his friends and fellow-citizens made a formal celebration in honor of the sixtieth anniversary of his arrival in St. Louis. A local business journal, *The Exporter and Importer,* gave a full account, explaining that Mr. Shaw was "the oldest living importer in the Mississippi Val-



*Restored from a photograph of an old photograph by the Shaw Camera Shop*

The center of the Garden as it looked during Shaw's last years. The "Pagoda" at the left and the patterned beds of the "Parterre" are conspicuous in the birdseye view on pages 8 and 9 (but at a disconcertingly different angle).



Henry Shaw as a vigorous man approaching 60. From a remarkably fine water color drawing in which various features of the developing Garden are brought together, somewhat symbolically, to indicate the scope of the institution he was building up. To the right is the Museum which then housed his rapidly growing botanical library and its associated Herbarium. These continue to grow and since the early 1890's have been housed in the Administration building, the north end of which consists of his town house, moved out here after his death in accordance with his will.

At the left (at a slightly different scale) are his Tropical Greenhouses which for several decades were immediatly in front of the old Linnaean House. In the distance, (beyond his arm), one sees his original Main Gate outlined against the sky. At his feet are cacti and other succulents with a Palm tree at one side and a Norfolk Island Pine at the other. In the colored original one can clearly make out a red flower of his favorite plant, the rose, about whose history he wrote and published a small book.

ley." To this fortunate circumstance we owe the preservation of Mr. Shaw's reply to the oration of the day. He begins his remarks, as a man of eighty well might, by pointing out that only a very few in the audience were old enough to remember what St. Louis was like in 1819. Therefore, his impressions and recollections of those days might be of interest:

"When I first visited these grounds, Tower Grove, I was in my nineteenth year. From the village of St. Louis I came through the bushes, by a narrow path winding among the sink holes or natural depressions of the commons, to the elevated ground now called Grand Avenue, where, open to the river, a beautiful prairie extended westward,[1] uncultivated, without trees or fences, but covered with tall luxuriant grass, undulated by the gentle breezes of spring, not a tuft of which can now be found.

"A patch of the wild strawberry could occasionally be seen, which has now entirely disappeared. I was informed afterward by M. Landerville, an old resident, that these lands, being fertile and productive, were the first selected by the colonists of St. Louis for cultivation; and according to the French-Canadian custom of alloting or conceding lands, had been given to heads of families settled at St. Louis for cultivation; and of one by forty arpents, running west and were called *La Prairie de la Barrière à Desnoyer,* from Louis Desnoyer, a concessioner, who kept the gate or *barrière* of the fence by which the commons of the village of St. Louis were surrounded.

"For a distance of two miles from where the eastern gate of Tower Grove Park now stands, to Taylorwick Station, or rather to the pond then and now existing there, no trees were growing; all was prairie, the long grass of which was annually burnt; it had for many years been left uncultivated, and had reverted to the state of a natural prairie, as it had probably existed from all times. On the small water course, running to Rock Spring and then to the mill pond of Mons. August Chouteau, now covered by the streets and houses of the city, were growing the Nymphaea[2] or water lily. I also observed on a gently rising ground a clump of hazel bushes; thirty years later the hazel bushes had disappeared, and in their place had grown up a grove of oaks and sassafras laurels[3]; in 1849 this house and tower were erected and it became Tower Grove."

Mr. Shaw lived on for nearly another decade after this celebration. His official biographer, the St. Louis journalist, Thomas Dimmock, has described his last days:

"On the 24th of July, 1889, he received numerous visitors to congratulate him upon the commencement of his ninetieth year. He was

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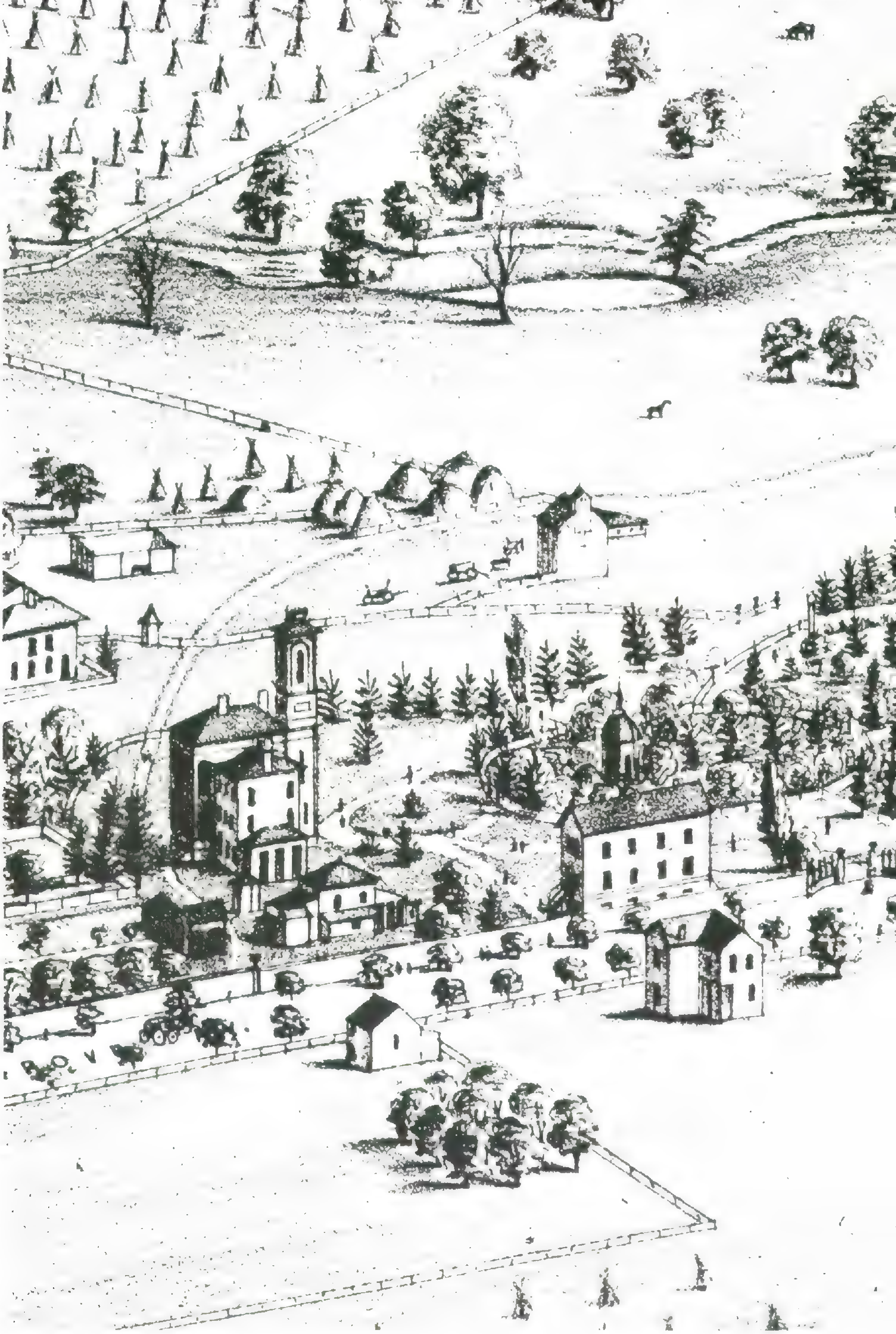
[1] Mr. Shaw *meant* westward. The Mississippi bends around the city and there was then prairie all the way to St. Charles.

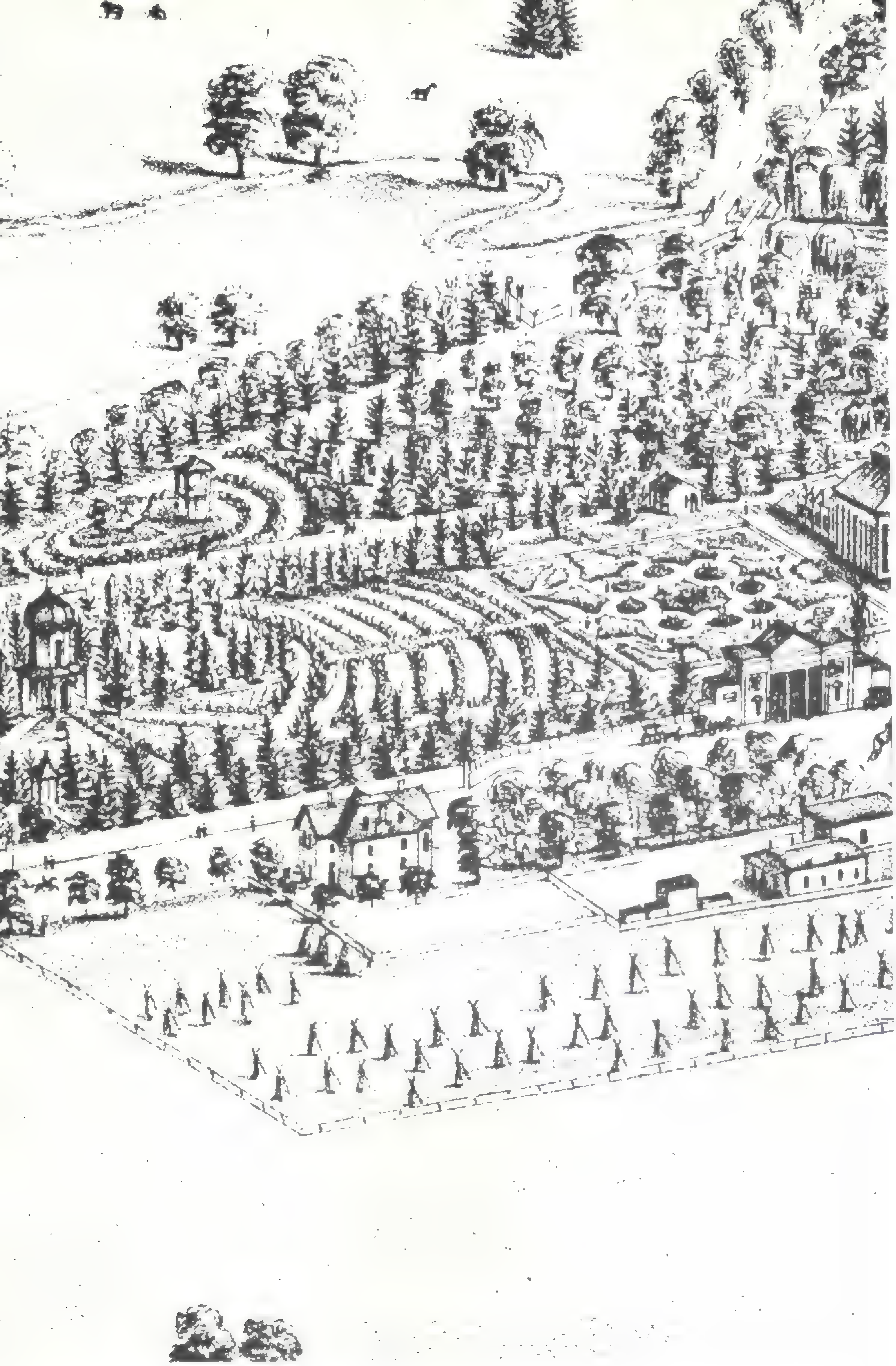
[2] It was appropriate that Henry Shaw's lands should have had native waterlilies since Nymphaeas have so long been a feature of the garden he founded.

[3] Henry Shaw was speaking as a botanist; the sassafras belongs to the laurel family and at one time was referred to as the sassafras laurel.



( 8 )

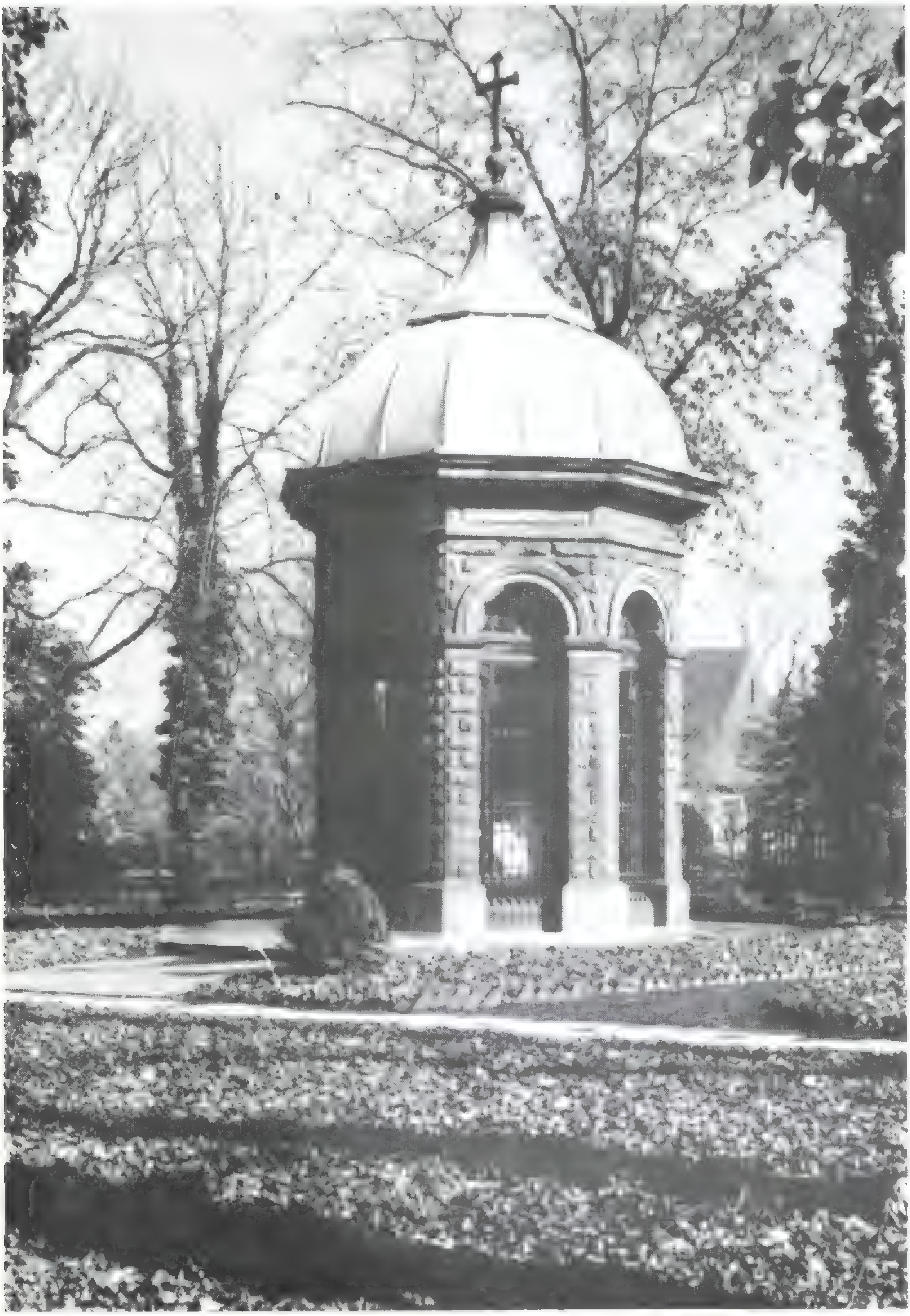
Birdseye view of the Botanical Garden as developed by Henry Shaw. From a plate in Co
the Museum with Mr. Shaw's Mausoleum rising beyond it, surrounded by its grove; the Cl
Gatehouse was built in 1890; the Pagoda with radiating beds of many kinds of plants; t
not yet grace the central one as in the photograph—see page 5—taken in the late 1
Arboretum and his entrance drive. It leads down to the left towards his home and the
Osage Orange trees which once lined the entrance road). Much of the farmland in the for



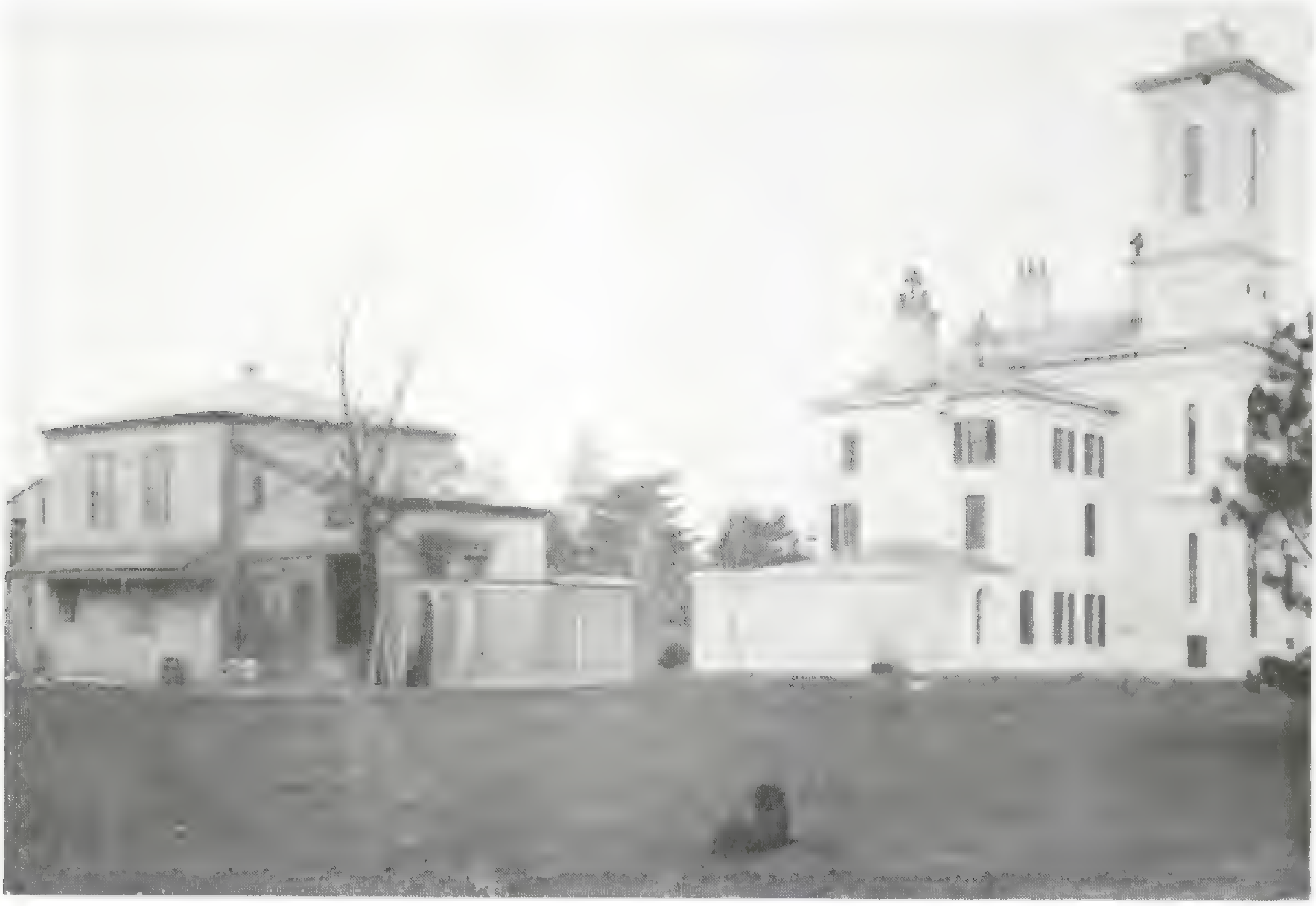
St. Louis, 1876. Going from left to right one sees: Tower Grove and its service buildings;
ate and the magnificent weeping willow beyond it which had to be removed when the
the ornamental beds of the Parterre (though apparently his statue of Juno Materna did
right margin one sees part of the Tropical Greenhouse and beyond that Mr. Shaw's
t large rose garden (from the lower end of which one can still see the long line of old
that towards the top of the picture, belonged to Mr. Shaw.

weak physically, though able to meet them in the drawing-room at Tower Grove, and his mind was as clear as ever. This, however, was his last appearance in public. An attack of malaria upon an enfeebled system speedily dissipated all hopes of recovery and he died at 3:25 Sunday morning, August 25th. The death, peaceful and painless, occurred in his favorite room on the second floor of the old homestead; by the window of which he sat nearly every night for more than thirty years until the morning hours, absorbed in the reading which had been the delight of his life. This room was always plainly furnished. The windows look out upon the old garden which was the first botanical beginning at Tower Grove. On Saturday, August 31st, after such

The Mausoleum Grove in late spring when the English Bluebells and Wood Hyacinths in white, blue and pink are in full bloom. To those accustomed to the family burial plots and tombs of great English estates this grove with its ivies and boxwoods and picturesque old fence seems charmingly appropriate as a burial place for Henry Shaw. Its sassafras and persimmon trees are from the same roots as were those he saw developing into a little grove on the prairie, which he protected with a fence when he bought the property. There is always a succession of spring bulbs coming up through the ivy from February to May. In the best years, masses of early snowdrops are spectacular on sunny days in late winter.



Mr. Shaw's Mausoleum, designed by Barnett, of red Missouri granite. The actual tomb, of white marble, bears above it a likeness of Mr. Shaw's recumbent figure, for which he posed. Since the time of the Crusades, Englishmen of consequence have been represented in effigy above their places of burial. Mr. Shaw followed this old custom, planning his tomb some years before his death, arranging the details with Mr. Barnett and with the sculptor, Baron von Miller of Switzerland.



Tower Grove House photographed from the east by the Treleases a year or so before Mr. Shaw's death. It shows the three-story servants' wing and service buildings to the left. These were all removed after Mr. Shaw's death. The servants' wing was torn down very soon and the building as we now see it was rebuilt to provide suitable quarters for Dr. Trelease, the first Director, and his family. The two floors of high-ceilinged rooms, and the ground floor beneath them (two steps up, above the basement) are structurally almost the same as in Mr. Shaw's time.

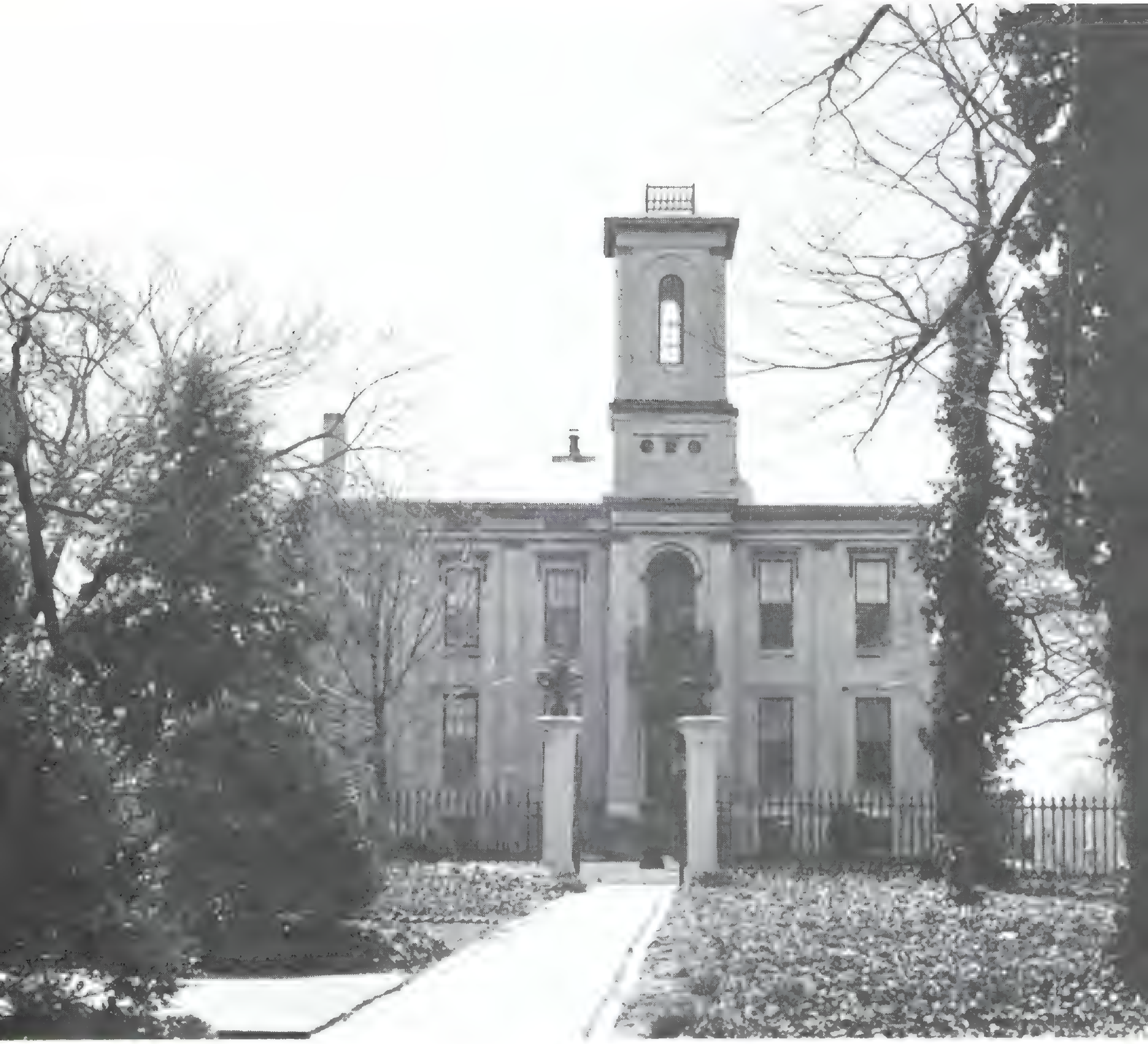


*Photo Claude Johnston*

This picture, taken from in front of the Mausoleum in the winter of 1966-67, shows Tower Grove much as it looked after the servant's wing had been torn down and replaced and the original brick had been covered with stucco.

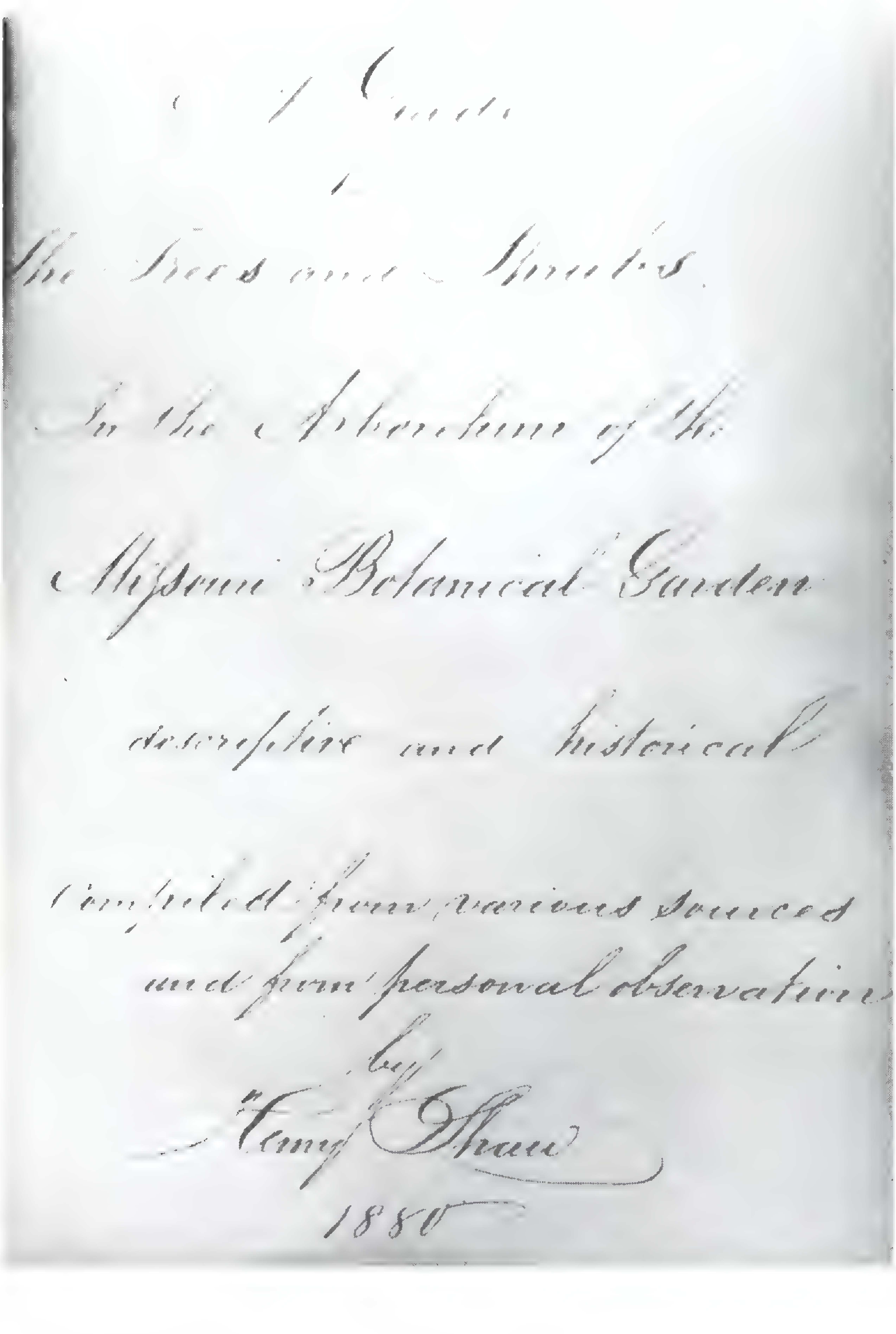
ceremonial as St. Louis never before bestowed upon any deceased citizen, Henry Shaw was laid to rest in the Mausoleum long prepared in the midst of the Garden he had created."

Just as a flower is the sum of many parts so the Missouri Botanical Garden is an aggregate of many units. The casual visitor, passing beneath the great trees, past the varied shrubs, and through the greenhouses fragrant with plants from all over the world, marvels at the horticultural splendor. Only a few realize that the Garden is much more than a large floral showplace.

It is, in fact, a multipurpose institution which is precisely what Henry Shaw intended. Farsighted, generous, and astute, in transforming his prairie estate, he laid the foundation for a scientific complex which was to be internationally famous. He planned and got under way an *integrated* Library, Herbarium, and Garden.

Their excellence has enabled first class scholars serving on the Garden's staff to carry out influential research and to educate generations of students who have, in turn, trained others. Therefore, today, more prominent taxonomists stem from Mr. Shaw's

Sun and shadow accent the beauty of the old ironwork on the rear gallery of Tower Grove House.



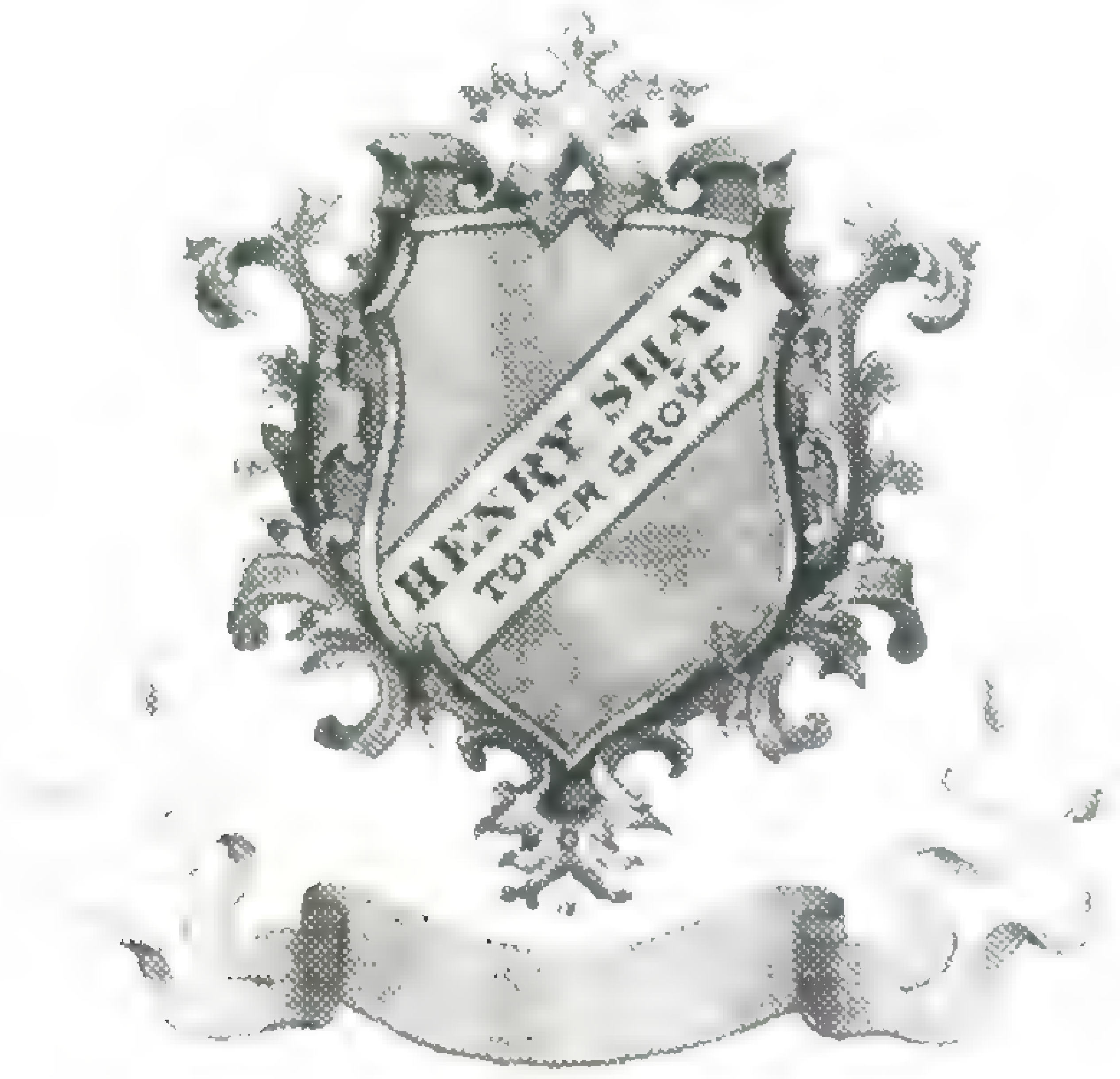
A Guide
to
the Trees and Shrubs.
In the Arboretum of the
Missouri Botanical Garden
descriptive and historical
compiled from various sources
and from personal observation
by
Henry Shaw
1880

By reading and study and consultation with experts, Mr. Shaw made himself into a worthy proprietor of a botanical garden. This shows the title page from the original manuscript of one of several articles and small books which he published.

Botanical Garden than from any other center in the New World. Such a combination of the theoretical and the practical produces innovators. For example: The study here of timber rotting and its prevention, united botany, engineering, creosote chemistry and common sense. For decades the Garden was a national center for the promotion of creosote preservation for fence posts, railroad ties and timber poles. B. M. Duggar's measurement here of the tobacco virus was the first important "Break-through" in our modern understanding of viruses. Here were developed mass display techniques for hanging baskets of chrysanthemums, here were pioneering introductions of cascade and other unusual chrysanthemums into this hemisphere, here the outdoor display of tropical water lilies was developed into a fine art and most of the main varieties seen throughout the world were bred here. These are still among the loveliest features for St. Louisans and for visitors from out-of-town.

Without the financial support of many organized groups and thoughtful individuals, however, these lavish displays could never have been continued. The Garden remains a private institution operated for the benefit of all. Created by Mr. Shaw's munificence, it receives no money from the City of St. Louis or the State of Missouri. The Trustees originally operated the Garden on the 1889 endowment, but doing so became ever more difficult. Today indeed, it would be impossible if the Garden did not receive increasing help from citizens who feel an enduring pride in the gift left here so generously by a most distinguished St. Louisan—Mr. Henry Shaw.

EDGAR ANDERSON;
DOROTHY BROCKHOFF



Henry Shaw's Bookplate.

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THE MISSOURI BOTANICAL GARDEN IS A MEMBER AGENCY OF THE ARTS AND EDUCATION SUSTAINING FUND

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Robert Waters, Tropical Horticulturist

# SOME FACTS ABOUT SHAW'S GARDEN

The Missouri Botanical (Shaw's) Garden was established in 1859 by Henry Shaw, a St. Louis businessman, to be controlled by a Board of Trustees for the public benefit. The Garden is a non-profit institution which receives no support from the city or state, depending on the income from the Shaw estate supplemented by contributions received from the public and an annual allocation from the Arts and Education Fund.

The old stone walls and cast-iron fences, the Linnaean House, the Museum Building, the part of the Administration Building which was Shaw's Town House, relocated in the Garden in 1890, and the Tower Grove House, his country home, all date from Mr. Shaw's time. The Main Gate and display and growing greenhouses are recent or before World War I. The Climatron, opened in 1960, is the world's first geodesic dome climate-controlled greenhouse and contains the Garden's main tropical collections.

## Hours

The Garden—70 acres—is open every day of the year except Christmas and New Year's. For the Main Entrance, grounds, Climatron, display greenhouses and Floral Display House:

May 1 through October 31 ........ 9:00 A. M. to 6:00 P. M.
November 1 through April 30 ...... 9:00 A. M. to 5:00 P. M.
(Sundays and Holidays .................. 9:00 A. M. to 7:00 P. M.)

For Tower Grove House:

May 1 through October 31 ........ 9:00 A. M. to 5:00 P. M.
November 1 through April 30 ......10:00 A. M. to 4:00 P. M.

The Display House presents four seasonal displays: November, Chrysanthemums; December, Poinsettias; February, Orchids; Spring, Lilies and other flowers. During the year are other shows, competitions and festivals sponsored by various Garden Clubs and Flower Societies.

Courses in Botany and Horticulture for adults are conducted by the Garden staff. Children's nature classes are provided free on Saturdays from mid-September to early June. A special nature program is held during the summer. Information on these activities is published in the BULLETIN or may be had by mail or phone. The scientific activities of the Garden are integrated with those of Washington University.

In 1926 an Arboretum—1600 acres—was established at Gray Summit, Missouri. Foot trails and roads pass through the Arboretum and are open to visitors from April 1st to May 15th.

The Garden Administration Building is located at 2315 Tower Grove Avenue, and the Garden's main entrance is at Tower Grove and Flora Place. The Garden is served by both the Sarah (No. 42) and the Southampton (No. 80) city bus lines.

Persons interested in helping to support the Garden and taking part in Garden activities are urged to do so through the "Friends of the Garden." Information may be obtained from the Main Gate or by mail or phone.

Phone TOwnsend 5-0440

# MISSOURI BOTANICAL GARDEN BULLETIN

SEPTEMBER-OCTOBER 1967 VOLUME LV NUMBER 7

QVERCVS
Eichbaum.

FOR THE UNUSUAL IN
HOUSE AND GARDEN
ACCESSORIES —

HAND-CARVED REDWOOD
HOSE GUARDS AND
MUSHROOMS ON DRIFTWOOD

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FLOWERS

AND

AN EXCITING SELECTION
OF GARDEN BOOKS

THE GARDEN GATE SHOP
AT THE MAIN GATE
TOWER GROVE + FLORA

# Missouri Botanical Garden Bulletin

Vol. LV No. 7 September-October 1967

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### COVER

*(PHOTO BY CLAUDE JOHNSTON)*

This fine woodcut of the oak is from *De Historia Stirpium* by Leonhart Fuchs, one of the many rare books in the Library of the Missouri Botanical Garden. Fuchs produced this sumptuous herbal in Basel in 1542. It is a work on the history of medicinal plants. Fuchs' volume marks the peak reached by the woodcut in portraying plants.

# FROM THE DIRECTOR

THE Missouri Botanical Garden desires to produce the finest possible publication of its type on the subjects of botany and horticulture. The staff of this institution is an unusual one; one which can contribute a great deal of knowledge concerning plants to the vast audience which has the privilege of falling within the sphere of its influence. It is absolutely essential that the knowledge be presented to the public in the most effective manner possible. There are probably many ways in which this can be done. We are striving to find one of those "best" ways.

The format and editorial policy of the BULLETIN is being modified. The number of issues has been changed, making the BULLETIN a straight bi-monthly publication, six issues per year. Each issue will be larger and more comprehensive. There are to be certain regular features or columns. The use of color will be more frequent. The Friends of the Garden and the Garden Gate Shop will be represented in each issue. It is our hope to emphasize topics which will assist the reader both with his own growing of plants and with his understanding of the importance of botany in general. We expect to feature gardening and horticultural topics of special importance to people living in this region of the country. We shall strive to achieve a pleasant balance with gardening and horticultural topics, scientific articles, and other informative features.

It is our desire that our subscribers find the BULLETIN sufficiently fascinating to not only keep it at the top of the heap of "things to be read," but to eagerly await the appearance of every issue. The changes in style, format and readability will be small at first, but we hope pleasantly noticeable. Our reading public can help. Let the Editor know the type of thing you want to see in the BULLETIN. Do write in. We want to hear from you.

I wish to take this occasion to thank Dr. Edgar Anderson for the splendid work he has done as Editor of the BULLETIN these many years. It has required close attention to detail and persistent effort on his part to ensure that every issue appeared as scheduled. All friends of the Garden are grateful to Dr. Anderson for his having dedicated so much of his time and outstanding literary ability to the BULLETIN.

It is a pleasure for me to introduce to you Mrs. Barbara Lawton who has assumed the editorial duties beginning with this issue. Mrs. Lawton is a graduate of Mount Holyoke with a major in zoology. She has been a free-lance writer and has edited other organizational publications.

DAVID M. GATES, Director

# THE PLANT COLLECTOR, THE HERBARIUM, AND THE FIELD

FIELD trips to exotic places are considered by systematic botanists (classifiers of plants) to be one of the great rewards of their profession. The systematist feels like the librarian who, suddenly freed from his labyrinth of book shelves, finds himself among the book-stalls on the banks of the Seine. In his drab herbarium of thousands of dried plants the systematist dreams of verdant fields of plants or sparkling waters that may yield new species or open up new vistas in the thousand and one problems found in botany. It is understandable why he is an inveterate window-looker-outer.

There are two major problems that confront the married male systematist in contemplating such a field trip. The first and more formidable one is his wife; of course if she is a tent and camp-stove devotee, there may be no problem at all, or almost none. Let's assume that the itinerant systematist has successfully managed to plant the suspicion in his wife's mind that *this* trip, taken alone, with her, or with other male systematists, may some day lead to the Nobel prize, or may bring the world-shaking discovery of some economically important plant. The second problem is the universal difficulty of finances for the expedition. Let us imagine that some granting agency, with small pangs of jealousy, has issued from the portals of a cold building in Washington the money to support the trip.

Some generalities are in order about our itinerant botanist: he may be committed to working in the small herbarium of a college or university, or in a large museum herbarium, or perhaps both. The itinerant botanist, no matter what magnitude of his professional relationships, makes an interesting vignette. For one thing (and this is important for readers who are gardeners) the average plant classifier, while he knows that his work has a bearing on horticulture and is often directly assisting the horticulturist, usually has as much interest in the less attractive waifs or weeds as he has for the eye-filling exotics which bejewel the velvet lawn or the glittering pool. This should not be a reason for criticizing him, as today's waifs, though they be of little beauty in a world of relative beauty, may contain the genetic "blood" of the exotics of tomorrow. Our gardens in a sense are primeval nature rendered civilized through the agency of man. The taxonomist, another name for a classifier, not only helps to tag the plants with a scientific name but also, directly and more often indirectly, apprises the world of the potential of the plants, whether they be the exotics of the future, the drugs of tomorrow, or the foods and timbers of the jet-age. The academic systematist hopes that, through his collections, he will unlock the secrets of biology's greatest problem: evolution and the formation of species. A true systematist is basically a student of evolution. Without the species problem, biologists, if we can imagine them surviving in such a world, would view the trees and herbs as they would view the stones of a graveyard.

Thus our systematist friend has many goals and is doing many things, some of which he is unaware of. Conveniences he must have too. The great rows of steel herbarium cases (as we see at the Missouri Botanical Garden) with the dried plants mounted on standard sized cardboard-like paper, meticulously arranged according to plant families and genera, hold hundreds of thousands of specimens from every nook and cranny of the world. They have been garnered from the recesses of Mozambique, or Panama, or from the waste lots of Missouri. These, in a sense the sweat and tears of a thousand and one collectors, are a library of plants. With his unknown plant in hand, the systematist approaches the specimens like the FBI agent who tries to match a set of fingerprints against the master file. The herbarium case is, however, more than a collection of dried plants bearing odd-sounding Latin names. It is the vegetation of the mountains and the plains, the plants of the tundra and rain-forests brought into the common study area. The leaves and the flowers of the herbarium specimen give us a clue to the great design of life; for the systematist these fragments of plants are the actors in the drama of evolution caught in tableau.

As the systematist works with his dried plants and their challenging names, he often runs into problems of several names having been assigned to the same plant or species. Solution will be found in part by searching the literature. Not only are the difficulties of nomenclature to be solved by probing rare and valuable journals, but problems of taxonomic importance, such as those relating to plant populations, ecology, cellular behavior, etc., must be investigated as much in the literature as in the field. For the systematist the library is an indispensable gold-mine.

But to return to our systematist and his proposed field-trip. The degree of preparation for the expedition depends on many things, principally centering around his destination, the length of the trip, the number of individuals in the party, etc. The first long trip, which could be to anywhere, but let's say to the

PHOTO BY CLAUDE JOHNSTON

Dr. John Dwyer collects a tropical plant specimen, carefully noting the locality, the date, the height of the plant, the color of the flower and fruits, as well as any additional data which he judges to be important.

American tropics, is usually the most exciting. We find our systematist friend worrying for weeks before the trip about snakes in the bush, his small pox shot, whether he will wear sneakers or boots in the field, how the Indians will greet him in the depths of the jungle, what chance he has in a small bush plane, whether he will really get a square meal, how the weather will affect his sinuses, etc. The one thing a neophyte doesn't realize is that his biggest problem in all probability will be drying the plants he collects. The plant collectors invariably come back in fine condition but unfortunately not always the specimens.

As our unbaptized tropical collector stands in the airport on departure day, his camera and duffel bag seems like a pebble set against the monument of professional baggage, especially plant presses, driers and corrugates for which there will probably be a disconcerting excess baggage charge. As the baggage disappears into the cavern behind the ticket-counter, our friend checks for the hundredth time his passport, wallet, and bicarbonate of soda.

When he arrives at his destination in the tropical country and has recovered from the initial impact of the warm air, the sight of palm trees, the sudden realization that he is far from home, and the inevitable delay in customs, he repairs to his headquarters. This can range from a hotel (usually one which can stand the sight of individuals in field clothes) to a laboratory in a field station, or can be simply a truck loaded with field equipment and ready to journey to accessible areas.

The actual collection of plants in the field is basically a simple procedure. Flowering plants are found in virtually all parts of the world, although seasonal factors may make one time of the year more favorable for collecting than another. Botanists rarely collect specimens without flowers and fruits, so necessary in critical identification. Some localities are poorly collected as they are relatively inaccessible. These represent prime targets for the veteran collectors who are interested in rarities. Rarities may refer to species which have not been reported in the general locality and thus represent range extensions, or may represent varieties new to science, or even new species completely unknown to science. The mountainous areas of the tropics, for example, usually possess a richer and more diversified flora than the sea-level areas. Well known areas may, in a sense, be poorly collected, for many botanists resist picking up what appears to them to be weeds; some, too, have the same reluctance about picking a specimen from a garden as the average citizen has about shooting a cow in a field. Grasses and sedges in the tropics are studiously avoided by many

PHOTO BY CLAUDE JOHNSTON

This herbarium sheet displays a horse nettle, native to Missouri, collected in 1847 by Dr. George Engelmann. He was thought by many to have been the most able 19th century student of systematic botany in the United States.

collectors as they bear a striking resemblance to the ones back home. Weeds, however, whether in the tropics or anywhere, are (or should be) fascinating as they hold the clues to many botanical problems. Weeds represent the bulk of the plant community and systematists are vitally concerned with plant populations, and the ecology of the plants and the animals. Consider too, the fact that the weeds offer marvelous microscopic vistas in their pollen grains, moulded by the hand of evolution; by the chromosomes, too, which carry an immortal stream of characters from parent plant to offspring.

But to return to our systematist in the field—what is he actually doing—his objective is clear: to collect plant specimens that may be deposited in a permanent herbarium, each collection to be filed under a certain species and bearing field notes of value to scientists. When you see a school-child placing a living plant in a magazine to press and dry the same, you are seeing in a rather crude way what our more sophisticated scientist is doing in the field. His approach is much more scientific and worthy of detailed description.

There are different approaches to collecting plants. If our collector belongs to the "plastic bag school," and has filled the bags with specimens, he carefully notes the date, height of the plant, color of the flower and fruits as well as additional data which he judges to be important. Then he may return to the base camp where he spreads out the samples preparatory to pressing them. Samples, slightly smaller than the standard 11.5″ × 16.5″ herbarium mounting sheet, are placed in a folded half-sheet of ordinary newspaper. A collection number is given to the newspaper (that is, actually to the specimen); the number corresponds with an identical entry in the field book. Obviously the field book contains the data above. The sample is placed in the newspaper and the latter is folded over; blotters or driers which resemble in texture those used on our desktops at home, slightly larger than the newspaper, are placed on each side of the paper. Our systematist continues to build up a stack of these newspapers with their samples and driers until the pile measures about a couple of feet in height. Using relatively rigid boards, one at each end of the stack, and long straps and ropes, he draws the pile together as tightly as he can. After thus pressing and partially drying the plants overnight, he removes the blotters and substitutes dry ones; in addition corrugated boards about blotter size are placed alternately between the blotters. The restacked pile is then bound with the straps and placed over a source of heat, e.g., a kerosene stove, large electric light bulbs, etc. The heat, passing through the ducts of the corrugated boards, dries out the blotters, newspapers, and especially the plants. When the plants are dried, say after two or three days, they may be removed from the presses (but not from the newspapers) and shipped back to the herbarium in the United States. Plants like grasses dry easily, while others like the cacti dry slowly and thus are avoided like the plague by most collectors. Drying in areas of high humidity, e.g. in the rain-forest of Darien, Panama, may represent a real challenge, as slightly damp plants readily succumb to molds and insect attack. On the other hand, plants properly dried and stored may last for centuries.

For a botanist a successful field trip has the therapeutic effect of a trip to the beach or a moonlight sail. Successful field work is a combination of luck, e.g. with the weather, good planning, good fellowship, being able to work 15 hours per day, and using common sense. Problems relating to transportation may be very decisive: poor roads, heavy rainfall, unreliable vehicles, etc. As for guides, these range from diamonds to agates, depending on their experience, knowledge, good-will, and resourcefulness. The ideal guide, the collector's dream, is one who not only brings the

*PHOTO BY CLAUDE JOHNSTON*

Dr. Walter Lewis, Director of the Herbarium, inspects some of the specimens in the Garden's plant collections. On either side of him are the shelved metal cases in which herbarium sheets are stored.

party to the right place but also participates in the actual collecting and supplies useful and accurate data about the plants.

Most collectors take several samples for each "number"; the duplicate plants are distributed to other herbaria on a kind of trading basis. In this way various institutions share their wealth of material and enhance their collections.

Thus the next time you meet a systematist off to some far away place, you may understand why he glows with enthusiasm. He is a man with a mission, committed to the message of nature. The poet has told us: "To him who in the love of Nature holds communion with her visible forms, she speaks a various language . . . " And the language of the field is one of love, of mystery, and immortality. For our systematist there is a message in the soft warm air of the jungle which kisses the blushing blossoms with a tenderness that defies description. The restless birds ply their exotic songs while butterflies, garbed in shimmering veils of golds and blues, weave their senseless courses through the dripping lianas and leafy labyrinths; thus he witnesses a drama in which the species carry on the magnificent saga of life and reproduction. Our friend becomes a member of nature's confraternity as he reaches out to clutch a fragment of the tree of life, to study it, to see in the timeless secrets of nature's garden a reflection of his own immortality.

John D. Dwyer

# THE FALL SCENE IN EDUCATION

I NEVER think of myself as a salesman until I see myself trying to convince people that they should enroll in one of the courses we offer throughout the year. It is normal, as a rule, for more people who are not members of "Friends" to register in a course, but recently this trend seems to be reversing. Maybe some are beginning to notice the course fee reductions for "Friends." Our courses are intended to give enjoyment as well as practical information.

There are five items of interest for adults between now and the end of the year:

1. On September 19, there will be the fall Gardening Information Panel at 7:30 p.m. in the Museum Building. Bring your gardening questions to the panel. Refreshments will be served and there is no charge to Friends of the Garden.

PHOTO BY KENNETH PECK

Students learn and practice commonly used budding and grafting techniques helpful to the home gardener. James I. McCaskill taught this course in February in the Museum Building. Shown here are two of the Garden staff members who took this course.

2. A one-day course on the third Saturday of October will be most helpful to persons wishing to grow plants under lights at home. Fall is the time to consider all of the indoor gardening aspects, among which supplementary lighting is frequently a problem. If you have a plant lighting problem, take this course.

3. The course in plant propagation has been revised and given a new look this year. We will not only work with cuttings of various plant materials, but will have practice work in potting plants and forcing bulbs. This is a good chance to get some interesting plant materials.

4. People interested in the natural history of woody plants would enjoy the five unusually informative evenings becoming acquainted with the dynamics and identifiable characteristics of trees and shrubs of Missouri and eastern North America. This course, Winter Botany, is also good for anyone who owns a piece of property in the Ozarks.

5. Indoor gardening with succulents and cacti will climax the year's course offerings comfortably before Thanksgiving. There will be two daytime sections, each meeting one time. Participants will make dish gardens to take home. The Garden will supply plants and soil (you provide the container). Bring a sandwich—we'll furnish coffee and soda.

See the "Coming Events" section for exact dates and times. If you want specific information about any of these courses, please call Kenneth Peck at the Garden—TO. 5-0440.

For children, I would highlight a few programs of special interest. In September, we'll resume the Saturday programs with plant propagation from cuttings on the 16th and making terrariums on the 30th. In October, we plant bulbs on the 7th, paint fall colors on the 14th, and have a rigorous nature hunt on the 21st. For November, there is one Saturday (November 4th) for making birdfeeders, and another for windowsill vegetable gardens on the 25th. On December 16, children will make Christmas wreaths in the largest single Saturday gathering of the year.

We appreciate your interest and invite your suggestions about courses and activities as they are now presented, as well as providing thought for new and desired courses. We already have a course planned for Spring 1968 that has never been offered here before. It will be announced in January.

KENNETH PECK

# FRANK STEINBERG AND THE ARBORETUM

THE story of Mr. Steinberg and the story of The Arboretum where he has been Superintendent since 1957 are intertwined. Each illuminates the other. He has been continuously on The Arboretum staff since 1927 when he came there from the nearby farming community where he grew up. That was the year when "The Gray Summit Extension" was officially launched on its career as an "Arboretum." For forty years his integrity and his deep-seated intelligence have played an important role in the development of the tract and in its efficient use.

The idea of such a place grew out of catastrophy. Mr. Shaw's fine collection of pines and other evergreens had been gradually sickening and dying off from increasing air pollution but St. Louisans continued to be complacent about the necessity of clean air for plants. Then in November 1917 the quiet air and dense night-time fogs which can make late Indian Summer so delightful, covered the whole Tower Grove neighborhood with thick poisonous blankets of dense smoke. Hundreds of plants in the

PHOTO BY CLAUDE JOHNSTON

Frank Steinberg, being interviewed by Dr. Anderson: "The Garden has been good to me. I'm happy in being associated with a conservation program. We believe in it and we practice it at home."

Garden's greenhouses were killed overnight or so severely injured that they had to be discarded. Legal steps were gradually taken to sell the Garden's unimproved acres and acquire property in clean country air.

At first there was merely talk of regarding "the present improved portion" as "the city show room and to have the factory [i.e., the greenhouses] at a considerable distance."* But as Director and staff began to study possible sites their visions widened. A place in the country may serve many different purposes for a city botanical garden just as it does for a city family. It was decided "to secure a considerable area of natural forest and to develop a real arboretum."

Eventually they selected "five separate farms, 38 miles from St. Louis on the Manchester Road" and proceeded to develop them into the "Gray Summit Arboretum." A master plan was drawn up by the same firm that had produced the excellent plan for the city garden by which we still operate. The country's greatest experts were consulted and one of them tramped through The Arboretum's hills and valleys making definite recommendations.

One serious oversight bedeviled the plan and the recommendations. None of the staff or the consulting experts knew much about the Ozarks. They were then still difficult of access and even St. Louisans had only casual acquaintance with a few easily reached areas such as the Arcadia Valley. All of the staff and consultants had been trained in the East or the North or in Europe! The plans were drawn up with little knowledge of the violence and variability of the local climate, the peculiar problems of runoff after cloudbursts, the complex tensions of forests and grasslands in the area. Frank Steinberg was therefore in an unusual position for a younger member of the staff. Under the direction of experts, but with a farm-boy knowledge of Gray Summit hills, fields and streams plus his own common sense, he came to understand *what not to do.*

Since it was known that wild flowers and shrubs could be bought in southern mountain areas and grown successfully on Long Island and in southern New England, the experts advised buying them in carload lots to create a wild flower area along the western border of The Arboretum. None of them survived, though a charming little vine which came with them as a weed persisted for some years. A "rhododendron dell" was planted in another valley where the soil was particularly sandy. "Six hundred azaleas, 100 *Ilex glabra*" and various other plants all perished, but fortunately one bargain barrel of mixed daffodils was purchased by Mr. Pring. They took to the place for ten years until it became too shady. Those which did the best became the nucleus for plantings of sturdy old-fashioned daffodils which still blossom every April in the sunnier parts of The Arboretum.

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*All of the phrases in quotes (and much other pertinent information) are from Director George T. Moore's annual reports to the Board of Trustees.

Such experiences made Frank Steinberg one of those fortunate individuals who acquire good judgment from living with the results of other people's bad judgment. He repeatedly saw the main current of the Meramec in full flood, coursing down the route originally chosen to carry a westward circuit road from the eastern part of the property; any of these floods would have destroyed such a road. He saw persistent efforts to build a permanent patrol trail down a woodland ridge, and over two tiny brooks, ruined by cloudbursts. The steep portion became ugly gullies. Bridges over the brooks have been swept away. Large tile culverts designed to carry off the water of the previous gully now litter a large ditch dug by run-off from cloudbursts.

With the background of these experiences, Mr. Steinberg has been able to conserve and develop the beauty and scientific usefulness of The Arboretum with a pitifully small staff. In addition to himself there are two Schlemper brothers who live nearby. One works under his direction 40 hours per week. The other works two days per week and also operates the patrol truck on ten of the busiest Sundays. Mrs. Steinberg, an able and enthusiastic gardener, helps maintain the attractive plantings around the entrance lodge and answers the telephone and the doorbell when he is out in the grounds.

His most time-consuming task each year is mowing the grassy meadows to keep the attractive background for flowering-trees, daffodils, and woodlands. He knows that once they start coming up to brush and young trees, they are very expensive to clear again. He knows that broom-sedge and other oily grasses are the Garden's worst fire hazard; that if they caught fire during a windy dry spell in the fall or early spring, they could destroy much of The Arboretum's beauty and usefulness for years to come. He also knows that late summer mowing will check broom-sedge and encourage good bluegrass. By clever timing he does all this in 800 tractor hours per year!

Part of the Steinbergs' influence on the development and maintenance of The Arboretum has been through their brilliant son, Vernon, now a rising young executive in St. Louis. He has

PHOTO BY CLAUDE JOHNSTON

Frank Steinberg's most time-consuming task is mowing the acres of grassy meadows. In addition, he does about 90% of the maintenance and repair work.

his father's deft way with tools and machinery. His close boyhood association with The Arboretum was sharpened by work with the Garden's staff and their students. This gave him a deepening interest in the flora and wild life, an understanding of their effects on each other.

During his college years at Washington University he worked summers and vacations at the city garden. As a high school boy he worked in The Arboretum for four summers. Under Louis Brenner's direction he helped develop the unique wild flower trails described on page 18. It was grueling work for hot weather but he took to it enthusiastically. The best of these trails owe much to Vernon Steinberg's skill and devotion.

Edgar Anderson

# THE GLADES OF THE ARBORETUM

THE Arboretum's greatest treasure is its limestone glades. The glades, edged by such trees as cedars, redbuds, and buckthorn, are conspicuous by being treeless. Visitors sometimes ask if they have been cleared or if they are part of an ancient prairie. The surprising answer to this is that our pioneer botanists, such as John Kellogg, knew these glades (sunny places in the woods) a century ago essentially as they are today.

If we study the total distributions of the plant species of the glades, we find many of them extending down into Oklahoma and Texas. If we trace the distribution of glade species northward, nearly all of them disappear within a few score miles. Apparently when the ancient glaciers pushed down almost to St. Louis, they scoured away the soils and subsoils which made these habitats possible. Some of the most characteristic glade species look like outposts of genera and species evolved in dry brushy barrens from Texas southwestward into Mexico. A good example of this is the buckthorn *(Bumelia lanuginosa)*, one of the commonest trees on the glades. It would seem to be the ultimate extension northeastward of a whole group of drought resistant trees and shrubs.

*PHOTO BY CLAUDE JOHNSTON*

Our paths through the open glades followed natural outcrops as far as possible.

PHOTO BY CLAUDE JOHNSTON

In June the Missouri evening primroses accent the glades with their pale gold blooms.

This environment is difficult in many ways. Some of the underlying limestones are dolomitic, which means that they have compounds of calcium *and* magnesium which many plants cannot tolerate. Furthermore the glades are thin-bedded. Some of the layers, locally know as "cotton rock," weather quickly and rain percolates down to more solid limestone or sandstone. It oozes along this surface to the glade farther down the slope. These long areas, which stay moist for weeks after a heavy rain or snow, come to look like man-made paths.

From late autumn to early spring, gelatinous masses of algae (chiefly nostoc) may be found in these damp places. In wetter years, they cover the ground like thick, blue-green carpets up to a foot wide and a yard or more in length.

Much of the summer rain comes in violent thunder storms so that sheets of water rush over the rocks and pebbles, leaving them with even less soil in the crevices than before, though the little that persists is high in nitrogen.

In this climate, plants like good drainage in winter and plenty of water in hot dry weather. The glades are soggy damp much of the winter and blazing hot all summer. This makes a rare habitat: a combined winter swamp and summer desert. This environment is so unusual that not many kinds of plants can grow here. As a result there may be great masses of those that can make it, giving a kind of ordered look to the landscape. The best of the glade plants are spectacular as well as exotic. Two of them take the shapes of Japanese bonsai trees; the buckthorn and the dwarf hackberry *(Celtis pumila)*. The Missouri evening primroses, their light yellow blossoms larger than a child's hand, are scattered as low clumps in among hundreds of plants of the pale cone flower, whose color ranges from deep rose purple through pink to pure white. The primroses and cone flowers are set off by baby's breath and the slender blue-white spires of the glade lobelia. It makes a splendid show in May and June.

The most difficult problem in developing a wild flower reservation is to protect the flowers from the public who come to admire and study. I am not talking about vandalism; that is quite a different matter. Among those who visit or help administer such a reservation, too few are aware of the damage that can be done by just walking about. Footpaths on a steep slope can turn into eroding gullies with one hard rain. Walkers wear away protective leaf mulch, damaging the somewhat deeper feeding zone where, with fungi and other organisms as partners, tiny roots are feeding not only shrubs and wild flowers but big trees. Fortunately man is a pathmaking and path-following animal. Thus a well-designed system of paths can help a reservation in many ways.

Gullying had already begun when I undertook the project of trails in the glade area of The Arboretum. Most of the work was done by Louis G. Brenner with student assistants, of whom Vernon Steinberg and Jonathon Sauer were the most outstanding. Out on the open glades, we followed natural outcrops of hard rock whenever possible. Dips were filled and massive rocks were moved to foil erosion. Brenner and Company became such artists in fitting their work to Nature's that it is now next to impossible to tell where one left off and the other began. Railroad ties and red cedar logs broke the destructive flow of water on the steeper slopes. Native plants, including various wild flowers, have gradually seeded in around them, stopping erosion effectively. After 20 years, the ties have begun to go to pieces. Within another 10 years let us hope they may be replaced with cedars from nearby, for the glades are an unusual asset, worth protecting.

EDGAR ANDERSON

PHOTO BY PAUL A. KOHL

Each year the colors of fall are doubly beautiful at the Garden's lake. The scarlet, orange and yellow of the trees are echoed in the shimmering water.

# THE COLORS OF FALL

As I sit writing this on a sticky summer day with the sprinklers keeping the grass green outside the window, it is hard not to become nostalgic for the cool freshness of an English summer. The grass there is green all year round and the flower colors soft even on the brightest day. But the thing that Britain lacks and which in Missouri compensates for the awful summers is the rich coloring of the trees in fall. The maples with their several colors on one tree are scarcely used for street planting there, and a group of the Sweet Gum which are scattered through Missouri woods would draw visitors from miles around when used in a good spot in England.

What is it that makes the fall color in this country so much more intense? There are two main reasons. One is the difference in the native vegetation which gives less potential color in Europe than in the New World. It is interesting to speculate on how the development of fall color might have represented an advantage to the tree during the course of natural selection. Whatever the reason, the fact remains that the brightest colors are found in plants native to areas with cool, sunny falls such as eastern North America and some regions of Asia.

This leads to the second reason which is that the intensity of color is affected by the weather during the fall. The leaves of plants contain several pigments which play a part in food manufacture. During the spring and summer the green pigment, chlorophyll, is present in such quantities as to mask the others, but as the season advances less chlorophyll is formed and the yellow and orange pigments, carotene and xanthophyll, become more obvious. Most of the food formed in the leaves is transported to other parts of the plant for storage, but if the season is one in which warm sunny days alternate with cool nights, not all the food will be carried away from the leaves. The sugars left there stimulate production of another type of pigment, anthocyanin, which is red. It is the combinations of the red and yellow pigments that give the range of colors. The very best combination of conditions for bright colors is this alternation of sunny days and cool nights and perhaps rather less rain than in an average season. Frost is not necessary and can often ruin the display by causing early leaf fall.

We are fortunate at the Garden in having well established specimens of some of the most brilliantly colored plants from this continent and from China and Japan. The lake area has two beautiful examples of the black gum, *Nyssa sylvatica*, whose shiny leaves turn to a brilliant scarlet. These two are interesting in that they color in succession, one having its full show and sometimes losing most of its leaves before the second turns. We might be warned by this example that there is a good deal of variation even within one species, and should select the plants wanted for their autumn color when they are actually showing how they will perform.

Another prime spot for connoisseurs of color is the area between the Main Gate and the Museum, near the Cleveland Avenue Gatehouse. Dr. Anderson has established here two specimens of golden larch, *Chrysolarix emabilis*, which mirror at one stage of their color sequence the clear yellow of a large ginkgo on the other side of the house. Nearby a young specimen of katsura, *Cercidiphyllum japonicum*, completes the cycle which began with pinkish-purple unfolding buds and passed through bronzy-green to a rich golden scarlet. Between this area and the Main Gate are examples of dogwood with a deep red fall color when in full sun, witch hazel with various shades of yellow, orange and red, sweet gum, Amur maple, yellow wood, fragrant sumac, barberry, Virginia creeper, swamp cypress and winged euonymus, each of which plays some part in filling the rich range of colors which means fall in the northern United States.

## Plant Material for Use in Missouri Arranged by Fall Colors

Many, of course, show a range of colors or change as fall progresses.

*Deep Red/Scarlet*

| | |
|---|---|
| Amur Maple | *Acer ginnala* |
| Black Gum | *Nyssa sylvatica* |
| Red/Pin Oak | *Quercus* spp. |
| Red Maple | *Aver rubrum* |
| Dogwood | *Cornus florida* |
| Sumac | *Rhus* spp. |
| Smoke Tree | *Cotinus coggygria* |
| Winged Euonymus | *Euonymus alatus* |
| Virginia Creeper | *Parthenocissus quinquefolia* |

*Orange/Yellow*

| | |
|---|---|
| Sugar Maple | *Acer saccharum* |
| Sweet Gum | *Liquidamber styraciflua* |
| Ginkgo | *Ginkgo biloba* |
| Sassafras | *Sassafras albida* |
| Katsura | *Cercidiphyllum japonicum* |
| Golden Rain Tree | *Koelreuteria paniculata* |
| Kentucky Coffee Tree | *Gymnocladus dioica* |
| Yellow Wood | *Cladrastis lutea* |
| Tulip Tree | *Liriodendron tulipifera* |
| Golden Larch | *Chrysolarix amabilis* |
| Witch Hazel | *Hamamelis* sp. |
| Barberry | *Berberis* sp. |

*Red/Brown*

| | |
|---|---|
| Parrotia | *Parrotia persica* |
| Bald Cypress | *Taxodium distichum* |

Derek Burch

# "FRIENDS OF THE GARDEN"

THANKS to *your* help, the Garden Gate Shop nearly doubled its profits this year! Our grateful thanks go to Mrs. William Robinson, Shop Chairman, her able cohort, Mrs. Fred Wenzel, and their committee. We feel most fortunate to have such a fine Shop Manager, Jane Stuessie. The new Shop Chairman is Mrs. Thomas Collins, and her Co-chairman, Mrs. Tom K. Smith, Jr. Their committee members are: Mrs. Nicholas Kurten, Mrs. Ralph Morriss, Mrs. Charles Ruprecht, Mrs. John J. Smith.

There were 362 new members of the Friends this year; 1,706 renewals; total members as of May 31 is 2,882. Help our membership grow even more! A membership makes a lovely gift to friends and relatives, and don't forget the Tribute Fund!

The Preview Parties were more popular than ever, and promise to be exciting again this year. Remember, your membership entitles you to these parties as well as reduced rates for courses, free admittance at the Gate (bring your card), and these grand new BULLETINS.

The Friends sponsored the slide lecture on great gardens of Britain by Gordon Blinko, British Royal Gardener. This brought in a profit of $575.

The Garden Gate Shop was among the many St. Louis shops that had a station wagon of shop items at the Station Wagon Sale put on at Stix Westroads parking lot. This successful event, sponsored by the St. Louis Garden Club, was for the benefit of the Garden.

We thank the Junior League most heartily for having their Debutante Ball at the Garden on June 24, and giving a great portion of the proceeds to the Missouri Botanical Garden.

The new Women's Executive Board of the Friends of the Garden, which took office on June 1, 1967, includes: Mrs. Joseph Lewis, Mrs. Bourne Bean, Mrs. Thomas Collins, Mrs. J. Lionberger Davis, Mrs. Charles Limberg, Mrs. James G. Alfring, Mrs. John Lehmann, Mrs. Eugene Hale, Mrs. Richard Hawes III, Mrs. Tom K. Smith, Jr., Mrs. Charles Ruprecht, Mrs. Ralph Morriss, Mrs. Guy Oliver, Mrs. G. Carroll Stribling, and Mrs. H. Leighton Morrill.

Also on the board are: Mrs. Fred Wenzel, Mrs. Paul Britt, Mrs. Wm. E. Vesser, Mrs. George Stemmler, Mrs. Duncan Dobson, Mrs. Carl Schlapp, Mrs. Edward L. Bakewell, Mrs. Walter Stern, Mrs. Joseph Griesedieck, Mrs. Samuel Soule, Mrs. John

Mitchell, Mrs. William Guy Heckman, Mrs. William H. Bixby, and Mrs. Howard Yerges.

The new board members wish to congratulate Mrs. James Alfring and her board for the excellent job they did during the preceding year.

We hope that you will all come and enjoy the Garden—and bring *new Friends!!*

PHOTO BY CLAUDE JOHNSTON

At the May meeting a check for $19,000 was presented to Mr. Harry Wuertenbaecher, Jr., President of the Board of Trustees of the Missouri Botanical Garden, by Mrs. William Robinson and Mrs. Fred Wenzel (on the left), Co-chairmen of the Garden Gate Shop. This check represents the net proceeds from sales during 1966-67 fiscal year. This was almost double last year's net proceeds of $11,000.

# FABULOUS RIVIERA: PARADISE OF THE CACTUS LOVER

If you yearn for singular destinations to satisfy an inborn craving for adventure, there are still many in this mad, hectic world of ours. Some seek the picturesque seacoasts and cool mountains, others prefer lush forests or spectacular conquests. Sometimes all of these can be found together and a package deal is possible. Such was the adventure that was handed to me last May.

The object of this trip was to attend the 9th Congress of the International Organization for Succulent Plant Study. The Congress has been held in some European city since its organization and the current one was in Beaulieu-sur-Mer, near Nice, France. The I.O.S. is a fairly new organization, less than 20 years old, and enthusiasts cannot just join but must be elected and passed on for membership. Every member is a qualified man who has contributed to the knowledge of succulents in one way or another by exploration, research, writing, etc.

This year's Congress was attended by representatives from Austria, Belgium, Czechoslovakia, England, France, Germany, Holland, Hungary, Monaco and Spain. I was the sole representative from the United States. The lectures dealt with explorations for succulents in remote sections of Brazil, Curaçao, Madagascar, and Paraguay; the taxonomic treatments of *Mesembryanthemum*, *Mammillaria*, and Cereoids; problems of culture in Hungary, Poland and other countries. Visits to leading cactus nurseries in southern France and northern Italy were undertaken and proved a revelation even to an American who has seen these desert plants where they grow naturally.

I will always remember Eze, a medieval village perched like an eagle's nest atop a high peak. This little village sets 1300 feet up at the edge of a sheer cliff and it traces its history to the days of Julius Caesar or even earlier. At one time a medieval castle stood at the very top. Now only ruined partial walls remain, surrounded by a beautiful cactus garden. The views one gets from these dizzy heights is astounding. The backlighted spiny stems of torch cacti rise above the red-tiled roofs, and the blue sea stretches to the horizon. There may be other small towns as picturesque as Eze, but truly this little rock-perched village offers in one sweep a grand view of nature's wonders: Flower-splashed mountains wedded to the sapphire sea.

La Turbie is an upland village near to Monaco, but high above it. In fact, one gets magnificent views of Monaco from the grounds of the Musée Trophée des Alpes, where a benevolent American has restored a colossal monument that Caesar Augustus built sometime around 5 B.C. High on the lower slopes of the mountain, La Turbie served as a fortress and was of immense importance as a place of defense in Roman times. Today, this quiet village with its winding streets, old arches, ancient stone houses, and wrought-iron gates is an artist's or photographer's paradise. The magnificent Roman ruin stands up nobly against the sky and can be seen from several vantage points as one travels the Corniche roads. The grounds of the Musée contain a number of wild flowers which happened to be in full bloom during my visit. Of particular interest was a spurge, *Euphorbia biglandulosa*, which is a luxuriant leafy bush with attractive yellow-green inflorescences and a most suitable subject for rock gardens.

What impressed me most about Monaco, no matter how you looked at it, either in closeup or at a distance, was the conglomeration of buildings compressed from the sea up the dizzy heights on the indented cliffs. Land is very valuable and the tiny principality cannot extend itself up the slopes anymore, so it is building out into the sea. Since you pass no customs barrier, you hardly know that you have left France. You see fewer gardens here but the streets and houses have the appearance of being well scrubbed.

PHOTO FROM A KODACHROME BY LAD CUTAK

Monaco's Jardin Exotique is located on the seaside cliffs and is an interesting tourist attraction in the principality.

Monaco has its Jardin Exotique which I had to visit, for Louis Vatrican, its director, has been a long time correspondent of mine. This garden perches on the giddy sides of the steep cliff and can be seen only from the sea; otherwise it is hidden from view even though you ride by in a car. The garden is predominantly given over to cacti and succulents and is quite impressive. The climate of the Riviera is perfect for desert plants and the succulents have proven this themselves. Thus everyone cultivates these bizarre plants and they really look good in the landscape.

At the extreme end of the Cap Ferrat peninsula at Pointe Malalongue is the Phare or Lighthouse, a welcome beacon to mariners. Surrounding it is a colorful garden in which cacti and succulents predominate and vie with geraniums, marguerites, marigolds and other herbaceous material. Several mesembryanthemums unfurled their glorious blossoms in the sun and were a riotous splash of color: light pinks, deep pinks, brilliant yellows, lavenders and purples. Ground-hugging gazanias of intense orange added to the melange of color. The roads leading to the Phare are lined with villas and coves.

I must tell you about "Les Cèdres," the private garden of Mr. Julien Marnier-Lapostolle, at St. Jean Cap Ferrat which overlooks the town of Villefranche. The garden is not open to the public but Mr. Marnier permits botanists and anyone else interested in plants to see his garden and will personally conduct

PHOTO FROM A KODACHROME BY LAD CUTAK

Villa "Les Cèdres"—former home of King Leopold II of Belgium. The grounds are about the size of Shaw's Garden and contain over 14,000 different kinds of plants.

PHOTO BY GILBERT PRESSENDA

Mr. Julien Marnier-Lapostolle leading a group of I.O.S. members through his cactus garden at St. Jean Cap Ferrat on the French Riviera.

you through it. From the entrance gate the visitor will notice at least a hundred Washingtonia palms lining the roadway on the right. On the left are trees and shrubs of botanical interest. The road winds around a large lily pool and then forks into an avenue leading straight to the residence. Formerly the home was occupied by King Leopold II of Belgium. Later it was bought by Marnier's father, who began developing the grounds around it. The present attractive plantings are due to Julien Marnier himself. He'll profess that he is not a botanist but he knows the plants by their botanical names. When you realize how extensive the grounds are and the thousands of plants grown, then you can appreciate this man's unbelievable memory. All told there are about eleven greenhouses, two very large ones for display and nine others of various sizes, plus countless cold frames. Mr. Marnier has one of the finest and most complete collection of succulents and bromeliads in the world at Les Cèdres. I can easily believe that about 14,000 species of plant life are represented.

PHOTO BY GILBERT PRESSENDA

Three I.O.S. members making notes and discussing succulents in one of the greenhouses at "Les Cèdres."

As fascinating as the outdoor plantings were, the greenhouses and frames really offered the choicest morsels to the botanist. The largest greenhouse contained the huge specimens. Here many species reached the roof. The beds were absolutely crowded with cacti. Since many of the plants were flowering, dashes of color were sprinkled all over. The hedgehogs, or *Echinocereus*, for instance, are noted for large flowers which open out wide in full sunlight. These massed in a group gave a spectacular show. The pincushions, or *Mammilaria*, have much smaller flowers with each stem circled by a coronet of pink, purple, yellow or white. There is no denying that cacti are peers among flowering plants.

Another house contained a group of euphorbias which look like cacti but are not related. Cacti are singularly American in origin (with a single exception), and the euphorbias (of cactiform shapes) take their place in Old World deserts. In appearance and bizarreness they are equally attractive, all with caustic milky sap, and many forms are available.

In an adjoining greenhouse still rarer and stranger plants appeared, numbered among the cucumber, milkweed, dogbane and passion flower families. The members of the cucumber family (cucurbits) were not in the least beautiful but great curiosities. *Xerosicyos danguyi*, for instance, is a vine with hoya-like appearance bearing roundish leaves like strings of coins and *X. decaryi* possesses very succulent and much smaller leaves than the former. *Melothria punctata* has globular tubers partly above ground while seyrigias look like twining sarcostemmas but are cucurbits rather than milkweeds. *Momordica rostrata* is noted for its greatly fattened stems and enlarged bases. Among the milkweeds, one that attracted my attention was *Caralluma penicillata* from Arabia. This is a giant among stapeliads because members of that group usually are less than a foot high but in Marnier's collection several plants were at least two feet tall and can get up to three feet at maturity.

The dogbane or periwinkle family is almost world-wide in distribution but the succulent members are only now becoming common in collections of botanical gardens. These fleshy-stemmed plants mostly originate in South Africa and Madagascar and are noted for their large colorful blooms. The very rare *Pachypodium baroni* var. *windsori* happened to be blooming during my visit and was producing large wheel-shaped flowers of beautiful geranium red color.

One would hardly associate *Adenia globosa* with the passion flowers, but it is one of the very few succulent members of that group. It comes from Tanganyika (now Tanzania) and is a true xerophyte. In my opinion it is the most conspicuous and strange item in Marnier's great collection. The tuber alone is as big as a washtub, about three feet in diameter, from which thick bluish stems issue and reach the rafters, necessitating periodic pruning. Thick thorns appear on the stems and are spaced about an inch and a half apart. (Too bad the plant is in a very cramped location.)

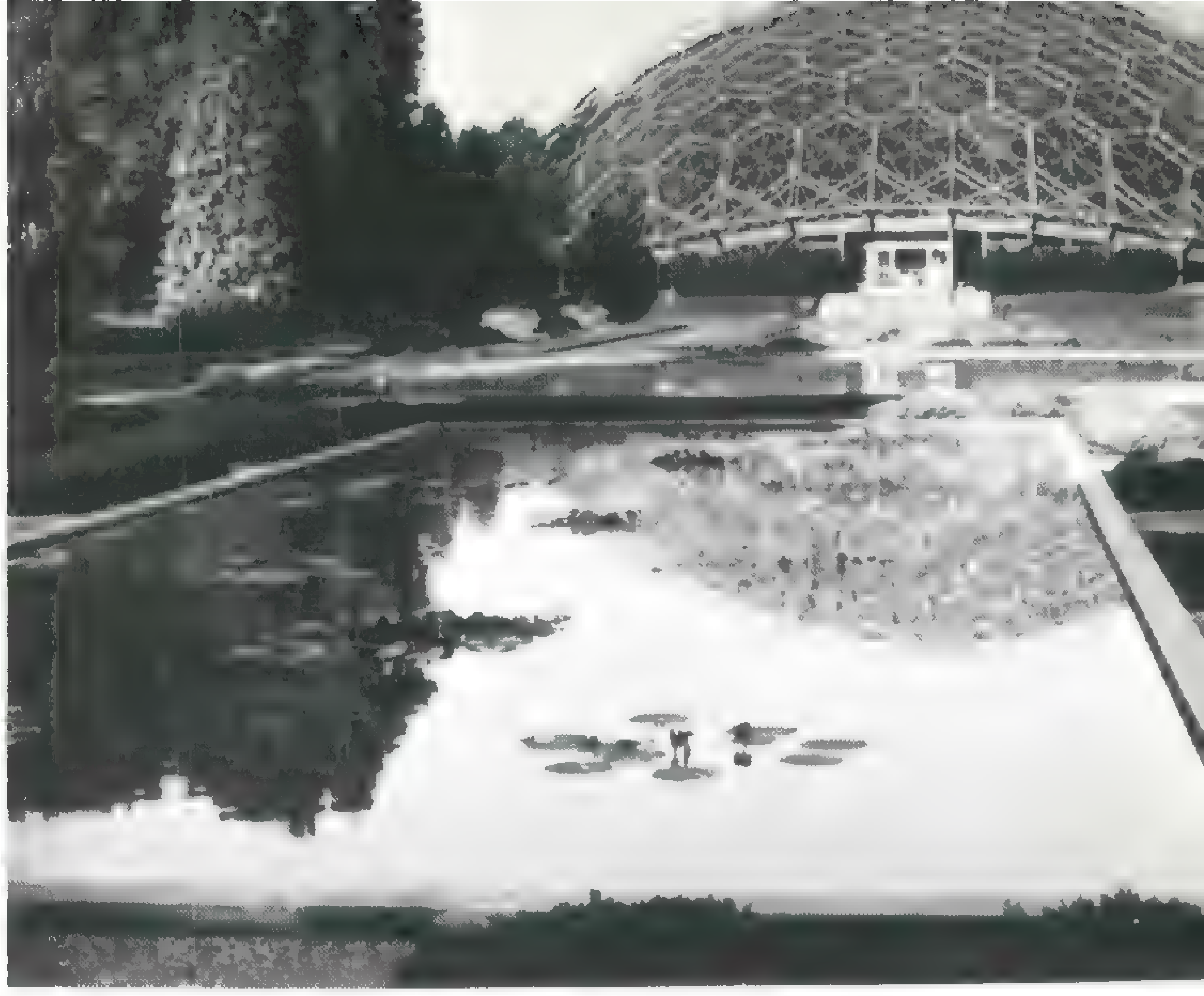
In innumerable frames raised above ground, were thousands of African succulents, many of them bearing an abundance of flowers.

If one is studying cacti and succulents in general or in monographic detail, it would be wise to go to "Les Cèdres" and attempt this project there for only at Julien Marnier's garden will you find them congregated in an almost all-inclusive manner. Furthermore, let it instill a desire to visit the fabulous region of the Côte d'Azur and fall in love with it as I have.

LADISLAUS CUTAK

*(While in Europe, Lad Cutak celebrated the anniversary of his fortieth year with the Garden.)*

# Why Is A Garden



# Like A Symphony?

This riddle is asked each year when Shaw's Garden, the St. Louis Symphony and eight other organizations come together in their annual joint appeal known as the Arts and Education Fund. These organizations are similar in that:

> they are all interested in those extras, whether they be music, art, or exploring the secrets of science, which make daily life more meaningful. Henry Shaw, who loved the theater and music just as he loved plants, understood this connection well. The Garden itself is a living testament to this view of the full life.
>
> they are all concerned with education, whether it be the multitude of classes held at the Garden for children and adults or the Symphony's many concerts held each year for school children.

The Arts and Education Fund, which is the one public appeal for operating income made by the Garden, has proved itself vital to our welfare.

The Fund can only succeed if all those who care for the individual institutions work for it and give to it. If we who love the Garden do not take part, who in St. Louis will?

TOGETHER . . . FOR THE FULL LIFE

# GARDENING IN ST. LOUIS

Fall is a good time to assess your garden. Thinking time will pay off, as this is a good season for planting and transplanting of perennials, woody plants, herbaceous borders. Be brutal with ne'er-do-wells that take up space and refuse to perform. When choosing trees for fall color, do this in the fall as the intensity and hue will vary considerably from one individual to another.

Plan to complete all planting of bulbs and deciduous trees and shrubs before freezing weather sets in. Plant bulbs: A good general rule is to cover the bulbs with three times their height of soil. Madonna lilies and narcissus should be planted in September. Delay planting of hyacinths and tulips until October and November.

Plant new varieties of peonies, and lift and divide old clumps, but only if necessary. Transplant and divide any other spring flowering perennials which have not already been done.

Geranium and rose cuttings may be rooted at this time.

Cut grass as long as it continues to grow, Fall-sown lawns are best. In early September, sow blue grass to make a new lawn or to reseed bare spots.

Cut back and destroy dead tops of perennials to a height of eight or nine inches. Remove remaining stubble in early spring.

Rake up and dispose of leaves and clippings as they accumulate. They are great for a compost heap. A heavy mulch spread around shrubs will rot down quickly and enrich the soil.

Keep lawns and shrubs, especially evergreens, well-watered.

Fertilizers are generally withheld from plants entering winter dormancy. The exception to this is lawns, which should be fertilized with a low nitrogen compound in early September (nitrogen makes soft growth which will be cut by frost).

Bring house plants inside before frost, repotting if necessary.

If you don't have a cold frame, now is a good time to plan for one. A cold frame is a good place to overwinter hardy plant materials which have not yet been given a permanent place in the garden.

# AN UNUSUAL AMERICAN SHRUB: SALT BUSH *(Baccharis halimifolia)*

For nearly forty years these graceful, willowy bushes have flaunted their silvery flower-heads in our "Knolls" in late September and October. Before fuel reform had removed much of the soot from St. Louis air it was an elegance that soon turned shabby; now in the best years it is with us for a full month. The beauty does not come from the rather inconspicuous little flowers that mantle the whole upper surface of the bush but from white hairs that support the pin-point seeds which the wind carries away. These hairs are silky with minute bristles that reflect the light. In the nearly horizontal sunbeams of autumn afternoons the bushes glow as if lit from within.

Eventually several of us on the garden staff took a real interest in these plants, their numbers were increased, and they were better taken care of. Most of the actual work was carried on by Louis Brenner, now Superintendent of Parks for Webster Groves, and by Edgar Evinger, now Superintendent of Greenhouses for the University of New Mexico. Evinger found them easy to propagate by modern methods. He took greenwood cuttings in June, shortly after new growth had hardened. By using Rootone #3 to stimulate root formation, nearly all the cuttings rooted and were kept in the greenhouse the first winter and in a cold frame the next. By that time all those which had been saved were large robust plants.

Mr. Brenner found that blooming is all from shoots which develop in the same year, so that he recommended spring pruning. He learned that branches when severely pruned produced great numbers of new buds so that he was able to cut back the larger bushes to within six inches of the ground and produce vigorous new shoots. With such treatment the bushes flourished. Occasional visitors wanted to know their names and where to buy them. A bouquet in the bay window of the Cleveland Avenue Gate House interested many people. Mrs. Mary Baer, expert in the various uses of dried flowers, supervised their collection and care, for use in Tower Grove House. When the bushes are conspicuously silver it is too late to dry the flower-heads successfully. They can be kept from wilting if put in fresh water but just as they become most handsome the seed heads ripen, the silver grows dull, then in a few days they shatter and it is time to throw them out before they become a nuisance. By hanging them upside

PHOTO BY PAUL A. KOHL

The salt bush in full bloom, showing the silver effect of the long white bristly hairs that surround the inconspicuous little flowers.

down to dry in a dark attic room of Tower Grove House, they kept their natural shape and were stiff enough for repeated use if treated with care. Much of the gray-green color stayed in the stems; the bright silver of the blossoms became ivory white, yet still caught the light beautifully.

Botanical books list groundsel bush and salt bush as common names for *Baccharis halimifolia.* Such Latin or "book-names" are not part of our common heritage of spoken English like "lily" or "moonflower." In the South where it is admired and used for decoration, Baccharis is sometimes called silverling. Good common names are themselves living things, kept alive and growing by those who use them.

EDGAR ANDERSON

# THE MISSOURI BOTANICAL GARDEN CALENDAR

## (September and October)

| | |
|---|---|
| September 2–10 | Henry Shaw Cactus Society Show |
| September 7, 8 | Aquarium Display<br>(Mississippi Valley Guppy Club) |
| September 16 | Children's Saturday Nature Program<br>"Table Top Greenhouses." (Bring 1-lb. coffee container and plastic bag large enough to cover.) Admission is free. 10:00–11:30 a.m. |
| September 16, 17 | Aquatic Show<br>(The Aquatic Guild of St. Louis) |
| September 19 | Gardening Information Panel. The Panel will deal with preparing the garden for winter and the care of house plants. Free to Friends of the Garden; $1.00 to others. 7:30 p.m. in Museum Building. |
| September 23 | Children's Saturday Nature Program<br>"Little Round Green Things and Others." Admission is free. 10:00–11:30 a.m. |
| September 23–25 | Dahlia Show<br>(Greater St. Louis Dahlia Society) |
| September 30 | Children's Saturday Nature Program<br>"How to Make a Terrarium." (Bring a wide mouth jar or small glass bowl.) Admission is free. 10:00–11:30 a.m. |
| September 30, October 1 | Harvest Show (Midwest Regional Council of Men's Garden Clubs) |
| October 3, 10, 17, 24, 31<br>Also given on October 5, 12, 19, 26, Nov. 2 | At 8:00–9:30 p.m.<br>At 1:00–2:30 p.m.<br>Plant Propagation<br>This general course for beginners will be taught in the Experimental Greenhouse by Clarence Barbre and Kenneth Peck. Friends of the Garden, $12.00; $16.50 to others. |

| | |
|---|---|
| October 7 | Children's Saturday Nature Program "Planting Bulbs." (Bring 1-lb. coffee container.) Admission is free. 10:00–11:30 a.m. |
| October 14 | Children's Saturday Nature Program "Fall Colors." Admission is free. 10:00–11:30 a.m. |
| October 21 | Plants Under Artificial Light. Practical equipment for the amateur or professional grower will be demonstrated in the Museum Building by Robert J. Gillespie. 10:00 a.m.–3:00 p.m. Friends of the Garden, $4.00; $5.00 to others. |
| October 21 | Children's Saturday Nature Program "Fall Treasure Hunt." Admission is free. 10:00–11:30 a.m. |
| October 28 | Children's Saturday Nature Program "The Forests of the Rockies." Admission is free. 10:00–11:30 a.m. |

(Call TO. 5-0440 for further information.)

## WHO, WHAT, WHERE, WHEN

Gordon H. Blinko, fifth generation British Royal Gardener, gave an illustrated lecture on the great gardens of Britain on May 1 and 2 at Washington University. Blinko has been head gardener for several outstanding public and private gardens in the British Isles, and is an accredited lecturer on general horticulture for the London County Council. The lecture was sponsored by the Friends of the Garden.

* * *

The St. Louis Herb Society's Herb Plant Sale was held on May 12, 13. About 50 different herbs—everything from catnip to Roman wormwood—were featured. Ably staffed by Society members, the Sale was a great success.

* * *

Spring Festival Day was May 14. The Liederkranz Society's chorus and orchestra gave a concert on the lawn of Tower Grove House. Music and traditional festival dances were also furnished by the Deutchmeister Brass Band and the American Aid Society Youth Group. There were gardening display booths by the main lily pools; and, of course, balloons and snow cones for the children. Some 3000 people braved the cool spring drizzle to enjoy this very special day at the Garden.

The Repertory Opera Theater presented a concert on June 11 dedicated to the memory of E. Gary Davidson (husband of Clarissa Start). It took place on the front lawn of Tower Grove House. This is reminiscent of the musicales often held on Sunday afternoons during the last few years of Henry Shaw's life.

* * *

In order to increase the holdings of New World tropical plants for the Flora of Panama research in the Herbarium, Drs. Walter H. Lewis, John E. Ridgway, and James Maniotis, and Messrs. Bruce MacBryde, Royce L. Oliver, and Joseph W. Strain left for Panama May 21, returning June 12. The group traveled to several parts of Panama, including Los Santos and the Chiriquí Lagoon area, by U. S. Air Force helicopter. About 4000 flowering plants were collected, pressed, dried and sent to the Garden for study. In addition, Dr. Ridgway collected hundreds of mosses and liverworts, and Dr. Maniotis found countless numbers of fungi.

* * *

During May and June, in relation to their graduate theses, Mr. Daniel F. Austin and Mr. Kenneth R. Robertson were collecting in Peru, Venezuela and Guyana. Their collections, chiefly in the morning-glory family *(Convolvulaceae)*, will make fine additions to the Garden's holdings of South American plants.

* * *

Twelve Debutantes were presented on June 24 at the Junior League Flower Ball held in the lower greenhouse complex. With Jim Hampton's technical help plus Paul Kohl's artistry in floral design and construction, and with the aid of many others of the Garden staff, the entire area was transformed into one big beautiful garden party setting. Even the weather was perfect as over 600 people danced and partied to the music of Russ David. (The Junior League is giving a donation to the Garden from their Community Trust Fund.)

* * *

For ten weeks of the summer, some 600 children took advantage of the free Summer Nature Program made possible by the grant from the Pitzman Charitable Trust. Ken Peck directed the program and had 5 instructors and 3 assistants working with him. This course of nature study uses the many and varied areas of the Garden. Interested groups of children ranged throughout the grounds as they studied plant and animal life of the Garden and learned to sow seeds, transplant seedlings and propagate from cuttings.

* * *

July found Dr. Gates and his graduate students, Ron Alderfer, Warren Porter and Elwynn Taylor, in Colorado, Arizona and other southwestern states. They studied the energy relationships of various habitats such as alpine tundra, sage brush, and desert.

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MISSOURI BOTANICAL GARDEN 1859

## FRIENDS OF THE GARDEN

Women's Executive Board: Officers: Mrs. Joseph W. Lewis, *President*; Mrs. Bourne Bean, *First Vice President*; Mrs. Thomas R. Collins, Jr., *Second Vice President*; Mrs. J. Lionberger Davis, Jr., *Secretary*; Mrs. Charles Limberg, *Assistant Secretary.*
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Ralph Rabenau, *Chairman*

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David M. Gates, Director
Edgar Anderson, Botanist
Clarence Barbre, Instructor
Clifford Benson, Plant Breeder
Will H. Blackwell, Jr., Research Associate
Derek G. Burch, Chief Horticulturist
Thomas B. Croat, Research Associate
Ladislaus Cutak, Horticulturist and Manager of Public Relations
Hugh C. Cutler, Curator of Useful Plants
John D. Dwyer, Research Associate
Waldo G. Fechner, Secretary of Board and Controller
Raymond Freeborg, Research Associate
James Hampton, Chief Engineer and Superintendent of Operations
Claude Johnston, Grower, Floral Displays
Paul A. Kohl, Floriculturist
Charles Kreher, Grower, Linnean Garden
Mrs. Barbara Lawton, Editor of Bulletin
Walter H. Lewis, Director of the Herbarium
F. R. McMath, Rosarian
Viktor Muehlenbach, Research Associate
Royce L. Oliver, Research Assistant
Mark W. Paddock, Administrative Assistant to the Director
Kenneth O. Peck, Head Instructor
Mrs. Marian Pfeiffer, Orchid Grower
George H. Pring, Superintendent Emeritus
John Ridgway, Curator of Bryophytes
André Robyns, Visiting Curator, Flora of Panama
Alfred Saxdal, Rose Grower
Owen J. Sexton, Research Ecologist
Frank Steinberg, Superintendent of the Arboretum, Gray Summit
George B. Van Schaack, Librarian
Susan Verhoeck, Senior Herbarium Assistant

# VISIT YOUR MISSOURI BOTANICAL GARDEN

## (Shaw's Garden)

The Missouri Botanical Garden's main entrance is at Tower Grove and Flora Place. The Garden is served by both the Sarah (No. 42) and the Southhampton (No. 80) city bus lines.

The Missouri Botanical Garden Arboretum—1600 acres—established at Gray Summit, Missouri, in 1926, is open to the public.

The Garden—70 acres—is open every day except Christmas and New Year's. For the main entrance, grounds, Climatron, display greenhouses, and Floral Display House:

| | |
|---|---|
| May 1 through October 31 | 9:00 a.m. to 6:00 p.m. |
| November 1 through April 30 | 9:00 a.m. to 5:00 p.m. |
| Sundays and Holidays | 9:00 a.m. to 7:00 p.m. |

For Tower Grove House:

| | |
|---|---|
| May 1 through October 31 | 9:00 a.m. to 5:00 p.m. |
| November 1 through April 30 | 10:00 a.m. to 4:00 p.m. |

The Display House presents four major shows: November, Chrysanthemums; December, Poinsettias; February, Orchids; April, Spring Flower Show. During the year other shows, competitions, and festivals are sponsored by various garden clubs and flower societies.

Courses in botany and horticulture for adults are conducted by the Garden staff. Children's nature classes are provided free on Saturdays from mid-September to early June. The Pitzman Nature Program is held for children during the summer. The Garden is world famous for its scientific research program. The scientists of the Garden hold teaching appointments on the staff of Washington University.

The Missouri Botanical Garden was established for the public's benefit in 1859 by Henry Shaw. The Garden, a non-profit institution, relies for support solely upon contributions from the public, the Arts and Education Council, and income from the Shaw estate.

Support your Garden and take part in Garden activities through the Friends of the Garden. Information may be obtained from the Main Gate or by mail or phone. (TO. 5-0440)

# MISSOURI BOTANICAL GARDEN
# BULLETIN

NOVEMBER-DECEMBER 1967 VOLUME LV NUMBER 8

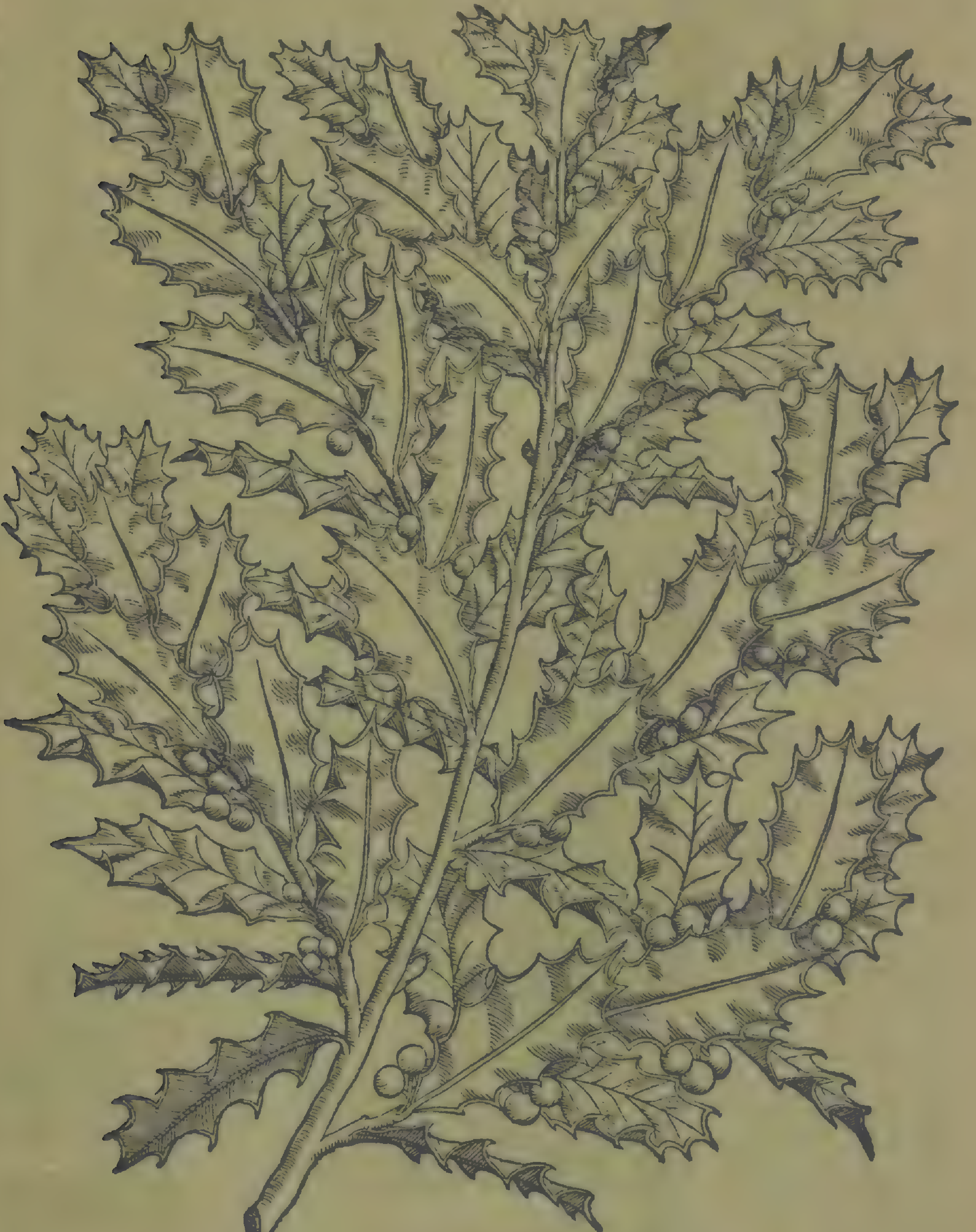

Photo by Claude Johnston

your favorite things! — We have them for house, garden, and Christmas . . .

- imported ornaments
- candle holders
- wild flower place mats
- garden books
- (etc., etc., etc. . . .)

— special showing November 3, 4, 5
at the Chrysanthemum Show.

THE GARDEN GATE SHOP

# Missouri Botanical Garden Bulletin

VOL. LV NO. 8 NOVEMBER-DECEMBER 1967

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Editor: BARBARA P. LAWTON

Editorial Committee: Edgar Anderson, Derek G. Burch, David M. Gates, Mark W. Paddock, Kenneth O. Peck.

Shop Representative: Mrs. Charles Ruprecht

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### COVER

Cover photo by Todd Studios

# ENGLISH HOLLY

## (COVER ILLUSTRATION)

GEORGE B. VAN SCHAACK

THE woodcut is copied from Mattioli's *Commentarii in sex libros Pedacii Dioscoridis Anazarbei de Medica materia* (Commentaries on the Materia medica of Dioskorides) of 1565. It represents the common and widespread holly of western and southern Europe, *Ilex aquifolium*, noted by Pliny as Aquifolium, the name still in use 1500 years later. In general, hardy only in the moist parts of our coastal states, it is little known to the Midwest. It has been cultivated since ancient times, and occurs in a wide variety of forms.

There is a pair of the Balkan strain of *Ilex aquifolium* in the Garden on the holly triangle between the Victory Statue and the new Lehmann Rose Garden. It has been damaged during severe winters, but has recovered nicely. This strain would undoubtedly prove completely hardy in southern Missouri.

Because it is widely used in England at Christmastime, it is frequently called 'English' holly. In many Catholic areas it is the 'palm' of Palm Sunday. Its leaves are said to have put forth their spines for the first time when the crowds cried, 'Crucify Him,' as Christ walked past on the streets strewn with branches of the holly, or 'palm.'

In folk myth, its planting around houses will prevent their being struck by lightning, and will ward off other evils. A curious use mentioned by Mattioli is tying its spiny leaves to the ropes from which meat is hung to prevent mice from reaching it.

Mattioli (1500–1577) of Siena wrote the most extensive and widely used commentaries on the pharmaceutical work of Dioskorides (1st century). His first edition in 1544 was essentially restricted to commentary. This edition of 1565 is several times larger, augmented from the original by all he had learned about natural history in the preceding two decades. His work appeared in over sixty editions in many languages, but never in English. The Garden library contains an excellent series of some twenty editions from 1549 to 1744.

# — *from the director* —

A CONGRESSIONAL hearing in Washington, D. C., was farthest from my mind as I climbed to the top of the Rocky Mountains in early August to study the plants of the Alpine tundra. Representative Emilio Deddario's staff called to ask if I would testify before the Subcommittee on Science, Research and Development (under the Science and Astronautics Committee of the House of Representatives). The committee desired advice concerning the great need for improved understanding of our natural environment. This would be a command performance, so of course I left the rarefied air of Colorado and flew to Washington, D. C., for the hearing.

I learned when I arrived in Washington that I could speak on the fundamental issue of understanding the natural history and ecology of the earth. Adequate food, clean air, space for recreation and relaxation are among the things we would wish for our children and grandchildren. To assure these precious commodities we must understand the complexities of the earth's green surface. The biologists of many countries have formulated an International Biological Program, known as the IBP, to assess the biological productivity of the earth during a 7 year period starting now. The program is expensive but necessary. Funding from Congress is required immediately and for that reason Representative Deddario held the hearings concerning the IBP. My recommendations were: 1. Immediately correct the shocking deficiency of money for the support of major biological facilities and collections; 2. Establishment of a National Ecological Center; 3. Vastly increased training of ecologists and taxonomists; 4. Greatly strengthen the ecological research programs of this country.

My final statement to the Committee is worth repeating here. "If we are not careful we will go down in history known as a sophisticated technological society which underwent biological disintegration for lack of ecological understanding."

DAVID M. GATES, *Director*

Photo by Paul A. Kohl

The graceful cascade chrysanthemums have been a part of the fall flower shows since 1930.

# CASCADE CHRYSANTHEMUMS

PAUL A. KOHL

COMMERCIAL growers are able to produce flowering chrysanthemums throughout the year by selecting proper varieties, shading them for definite periods or lengthening the day with lights to bring them into bloom according to a prearranged schedule. Before this technique was developed, November was always considered the month of the chrysanthemums and it is still so associated in the minds of many people. A pot of blooming chrysanthemums on a hot August day seems as incongruous as a person wearing a swim suit in Alaska in December.

Chrysanthemums have been displayed in Shaw's Garden each November for many, many years with picture records in our files dating back to 1903, a span of sixty-four years. Chrysanthemums vary greatly in size and shape of flower, in color and in habit of growth. The early chrysanthemum shows contained mostly specimen plants, standard or single stem kinds and the bush varieties, with their many sprays of flowers on each stem. In 1920 the Garden exhibited hanging baskets of chrysanthemums for the first time and they still are a feature of each November display. In 1930 the graceful cascade varieties were introduced and they, too, have been a part of each show. It is amazing to us that after these many years the "cascades" evoke as much comment and interest as if they were a novelty and being shown for the first time. Questions soon follow by phone and by letter. "Where can I get cascade chrysanthemums; can I grow them in my home or on a wall; how long does it take to grow the plants; how are they trained; does one need a greenhouse?" We do grow our plants in greenhouses although in some parts of the country they are grown in the open. Cuttings are purchased or rooted in

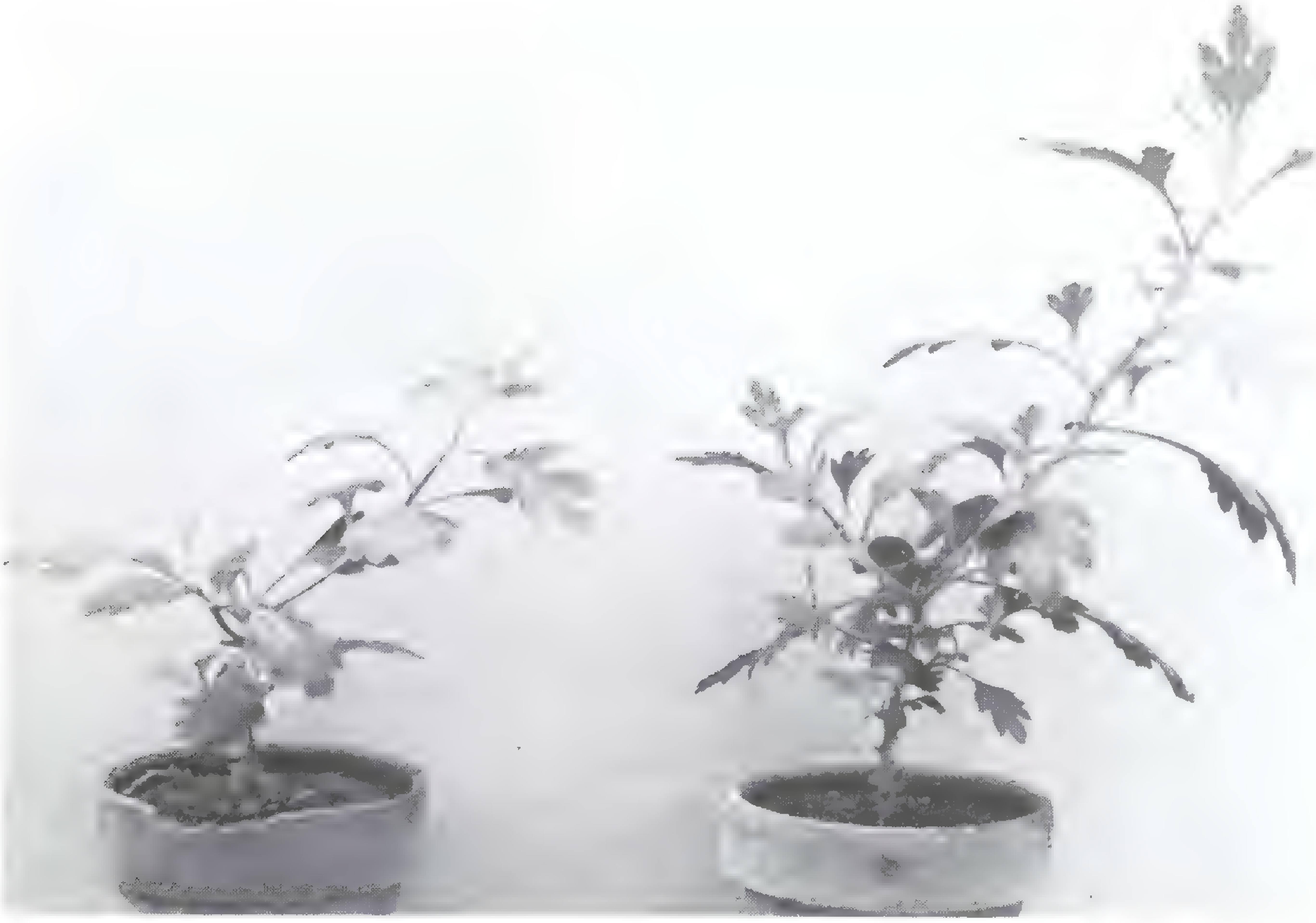


Photo by Paul A. Kohl

Terminal growth has been pinched back in these young plants. The uppermost lateral shoot is now the recognizable leader. Other side-shoots have been pinched back to two or three leaves.

February or March. Plants are first grown in 2½- or 3-inch pots and as they increase in size are shifted to 4-inch and later to 6-inch pots, the size we use for exhibition. Plants started early and grown to larger sizes, or pots containing more than one plant, will need 7-inch or 8-inch pots.

As soon as a young plant is about five inches high it is pinched by removing a bit of the terminal growth. When lateral shoots are formed in the axils of the leaves the uppermost one is left unpinched to form the leader of the plant and each of the remaining side-shoots is pinched back to two or three leaves. As growth continues these pinched laterals will branch again and they in turn are pinched and so the pinching continues every week to develop bushy plants. As the leaders continue to grow, they are tied to wire supports which have been inserted at the edge of the pots and bent at an angle of about 30 degrees. The leaders must not be tied too tight as the stems increase in size with age. Pinching laterals and shaping the plants continues until mid-September when the flower buds appear. In early October the cascades are placed on a shelf or elevated on the greenhouse bench, facing south. Slowly and carefully the cascades and wire supports are bent over the sides of the pots so that the leaders are gradually

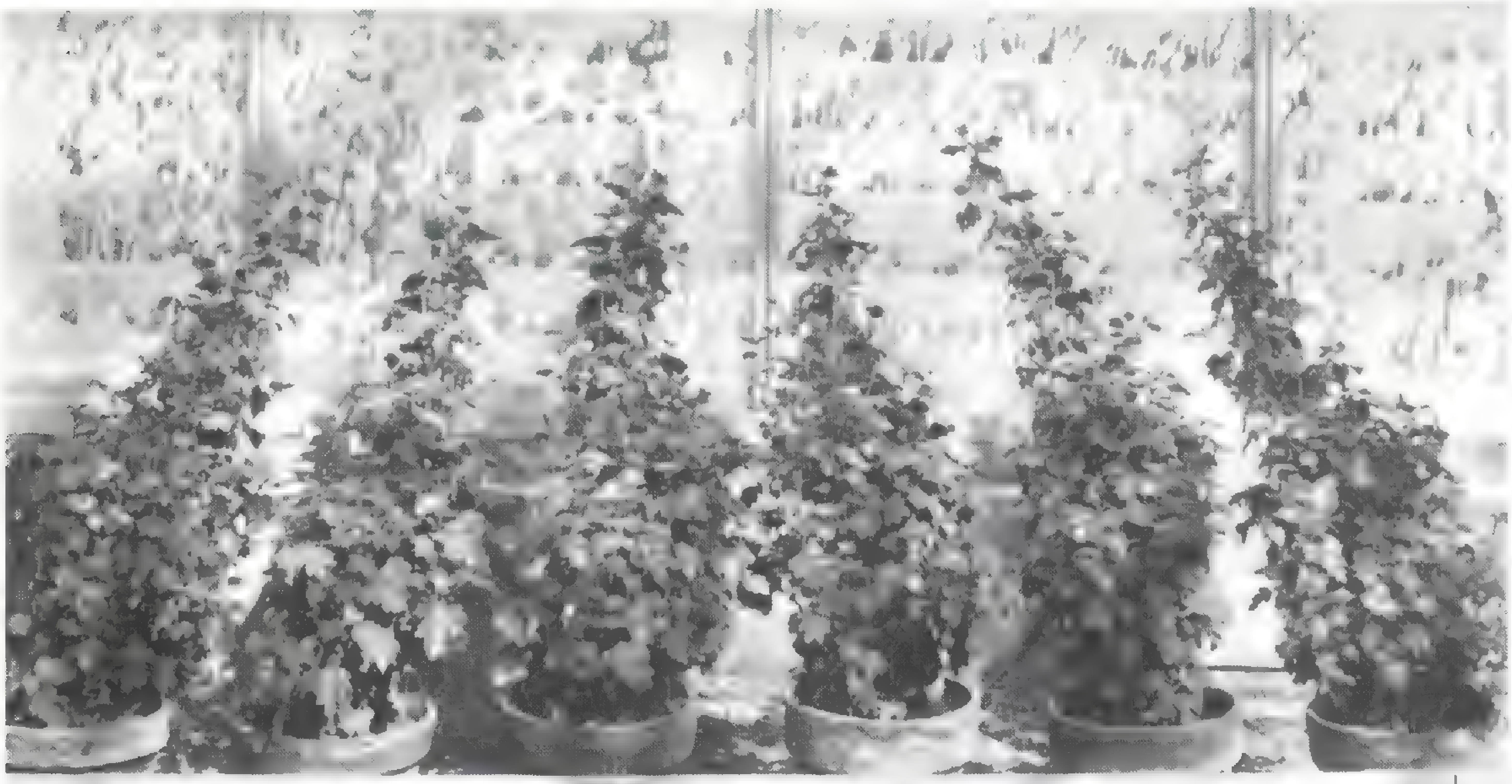


Photo by Paul A. Kohl

As the leaders continue to grow, they are tied to wire supports which have been inserted at the edge of the pots and bent at an angle of about 30 degrees. (The background of this photograph illustrates a common way of controlling light in greenhouses. The paint, spattered on the glass panes, cuts the sunlight to the desired amount for the plants being grown.)

Photo by Paul A. Kohl

In early October, the cascade chrysanthemums are placed on a greenhouse shelf facing south. The leaders and wire supports are carefully forced down into a vertical position.

forced downward in a vertical position. Several days after the initial bending, the weight of the plants will slowly bring them to a vertical position. This is the most critical stage in the growth of the cascades. The laterals, with their developing buds, will turn upward in a few days. Watering, feeding, spraying for insects, particularly aphids and spider mites, are the only cultural practices to perform until flowering time. After the cascades are staged, the wire supports are cut away from the main stems and removed from the pots.

Any small-flowered chrysanthemums having thin, pliable stems may be trained as cascades. Seeds of these chrysanthemums may be secured from some English seed houses and cuttings or plants from a few nurseries in this country.

*(Be sure to see the 1967 Chrysanthemum Show, November 5-26.)*

# PLANTS, MAN, LIFE AND EDGAR ANDERSON

HUGH CUTLER

THE few copies of Edgar Anderson's *Plants, Man and Life* on sale at the Garden Gate Shop are the only ones left of the English edition. The American edition was sold out several years ago.

Dr. Anderson has long been one of the most noted and active figures in botany. Over 2000 of his scientific papers, notes and popular articles have appeared, scattered through so many different journals that no one has been able to assemble a complete list. For nearly 45 years the Garden BULLETIN has carried his writing. Early articles, written when he came here in 1922 as geneticist and assistant professor of botany at Washington University were unsigned, following the custom of the BULLETIN at that time, but an Anderson article can usually be identified by its breezy style, diversity of content, and "let's-look-at-this-together" attitude.

Dr. Anderson was raised about the campus of an agricultural college, Michigan State at Lansing, where his father was Professor of Dairy Science. He received his Bachelor's Degree there and went on to Harvard for his degrees of Master and Doctor in Science in 1920 and 1922. When he came to the Garden in 1922-23 he worked to re-establish the School for Gardening, taught at Washington University, and continued his research. In 1923 he married Dorothy Moore, who had studied botany at Wellesley.

From 1931 to 1935 he worked for Harvard as arborist of the Arnold Arboretum, and much of his writing during this period appears in publications of the Arboretum. It was during this period that he helped establish the Herb Society of America and became its first President-at-large. For years nearly every number of their magazine, *The Herbalist*, contained one of his articles.

In 1935 Dr. Anderson returned to the Garden as geneticist and to Washington University as professor.

Most of Dr. Anderson's scientific work concerns the definition of relationships of plants or the relationship of plants and man. This probably grew out of his agriculture college environment, his training at Harvard, and the great concern he has for people. The methods he used for the detection and analysis of relationships in plants, have been adopted by workers in many fields. As a result, Dr. Anderson, though trained as a geneticist, is responsible for new attitudes in many other areas. He has been president

Photo by Herb Weitman

Dr. Edgar A. Anderson, first associated with the Missouri Botanical Garden in 1922, has long been one of the most noted and active botanists in the world.

Photo by Kenneth Peck

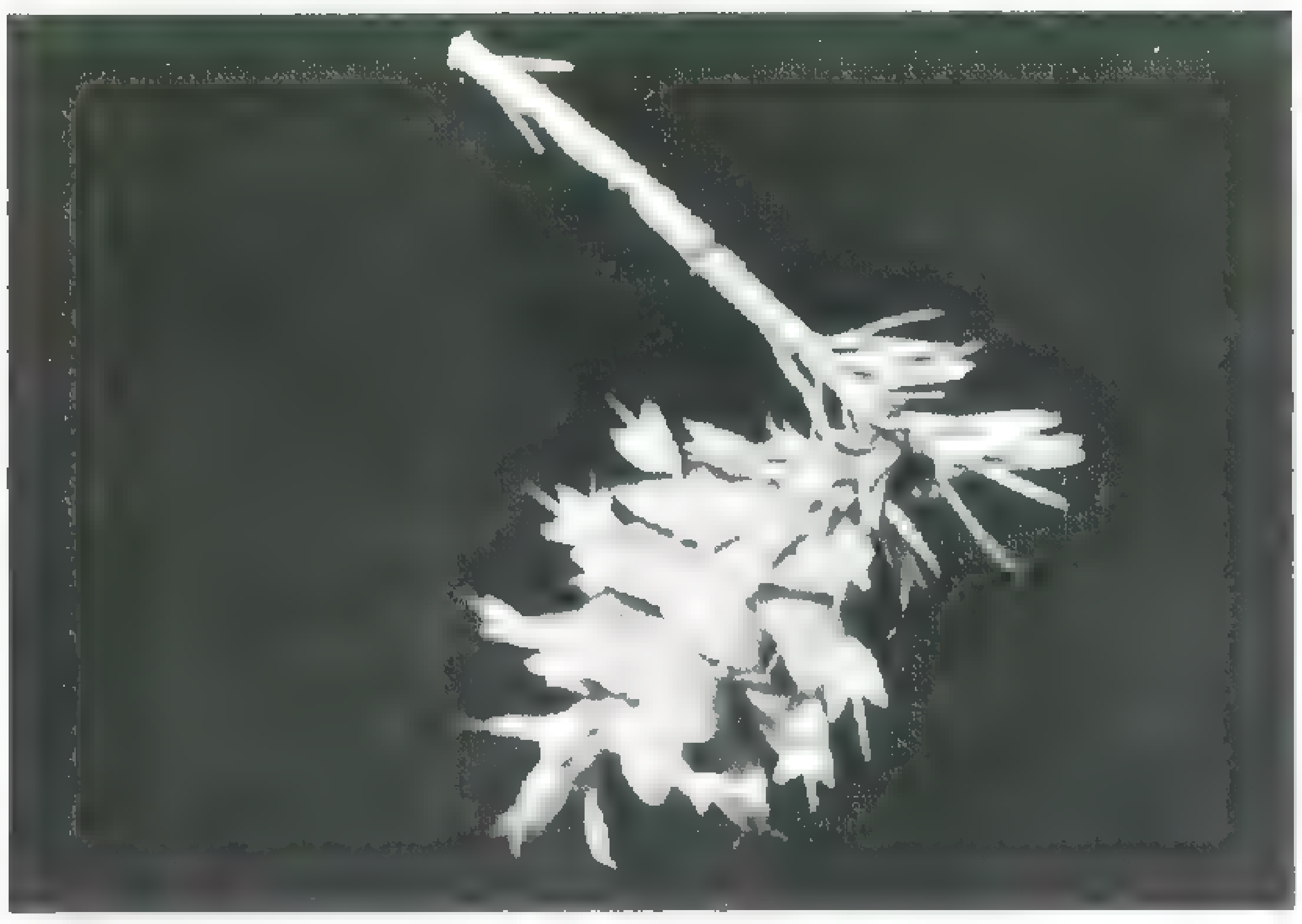
Dr. Anderson, second from left, leads an interested group on a winter tree walk. He teaches botany for the layman in Garden courses. Here he is shown pointing out the unusual features of *Corylus contorta,* Hort., commonly called Harry Lauder's walking stick.

of the American Botanical Society, Society for Economic Botany, and other scientific organizations. He is one of the few scientists to be elected to both the National Academy and the American Academy of Arts and Sciences.

Dr. Anderson inspires all sorts of people, from provincial and unschooled countrymen to leading scientists. St. Louis gardeners appreciate Dr. Anderson's knowledge, skill, and intuition with such complicated groups as narcissus and the native asters. The simple methods and questions he uses with students often start them on quests for information which last a lifetime. Many technical papers appear with a note similar to this: "We are especially indebted to Dr. Edgar Anderson for his critical and stimulating suggestions." Dr. Paul Mangelsdorf of Harvard University, and Dr. Paul R. G. Reeves in their comprehensive study, *The Origin of Indian Corn and Its Relatives*, wrote: "And thus this line of reasoning has led us to consider seriously for the first time, an unpublished suggestion by Dr. Edgar Anderson that teosinte is nothing more than the product of the natural hybridization of Zea and Tripsacum. We had previously dismissed this suggestion as fantastic, and not until the summer of 1937, when we had convinced ourselves that exchange of chromatin between Zea and Tripsacum does occur, did we again consider it."

Anderson has an uncanny ability to discover the essential elements of complex problems. One of his most popular BULLETIN articles was an apparently simple study of the structure of a potato entitled "A Quiet Evening with a Potato." This was first given about ten years ago as an evening talk at the annual dinner meeting of the Men's Garden Clubs of America. Only a few weeks ago I had dinner with one of the men who heard that talk and when a baked potato was served he said, "Ever since Dr. Anderson told us that a potato is a stem, I've had to study each one before I ate it."

*Plants, Man and Life* is essentially an autobiography, telling of Anderson's studies and interests. It is so alive that it is being reprinted by the University of California Press. But there is no need to wait, for if you are lucky, you can still buy one of the few remaining copies of the English edition at our Garden Gate Shop.



# THE BOTANY OF CHRISTMAS

EDGAR ANDERSON

## I. Christmas Trees

Traditionally Christmas trees were firs *(Abies spp.)* and though many other kinds of cone-bearing trees have been pressed into service (junipers, deodars, spruces, pines, red cedars, hemlocks, cypresses, arbor-vitaes, redwoods), it is still the firs, and their close cousins the spruces, that provide most of this country's holiday trees.

The leaves of both firs and spruces are so small and narrow we call them needles, though in some firs they are over two inches long. Firs and spruces are enough alike to be confused, even by people quite knowledgeable about such things; it is an easy matter when you know where to look.

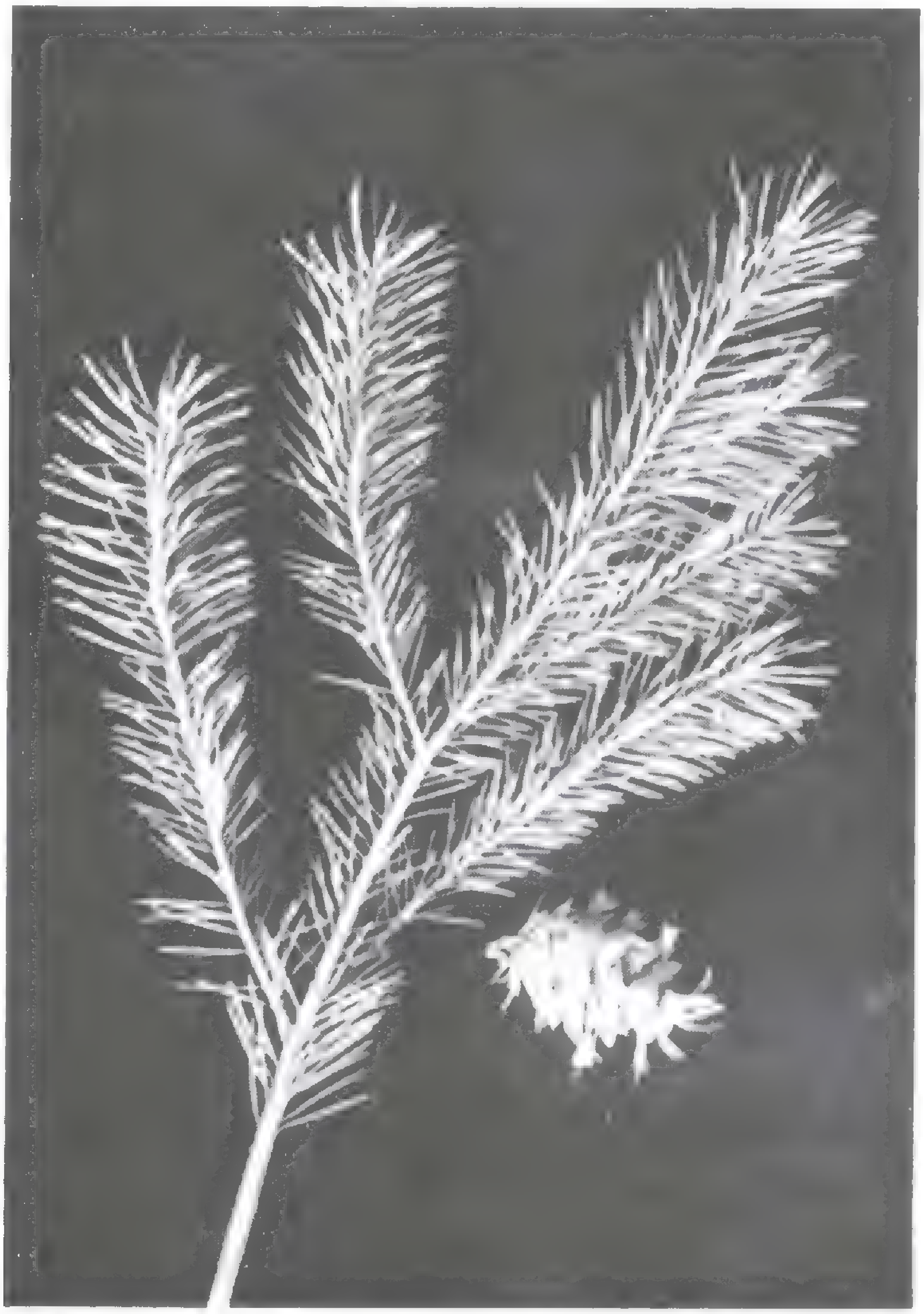
Just examine the branches from which the old needles have fallen. On the spruces, each needle leaves behind on the twig the pointed little woody spike which bore it. Naked branchlets feel rough to the touch; the tiny points can be almost painful if pushed against your cheek. They stay on for years, sometimes even after the branch has died. On firs, falling needles leave flat, circular scars behind, neat and smooth.

Even when you can't decide by this test, it is still giving the right answer, for there are trees which are neither firs nor spruces. They are intermediate in most ways but have a few peculiarities of their own. These are the Douglas firs, also called Douglas spruces, *Pseudotsuga taxifolia.* The beautiful cones are unique. They have long curving projections that extend out way past the cone-scales, odd but decorative. Their old branches are not studded with sharp little points, but neither are they perfectly smooth. A falling needle makes a flat oval scar raised enough above the surface that the twig as a whole feels neither like a true spruce nor a true fir. The twig does give you the right answer, you see.

Pines have longer, narrower needles than firs or spruces, borne in bunches of two to five depending upon the kind of pine. The needles are in twos in the Austrian pine, threes in the Scots pine, and fives in the white pines.

Hemlocks are peculiar in having much shorter, less regularly spaced needles; the branches seem almost fern-like. The graceful cones are about the size of the end of your little finger. If their needles would only hang on longer, they would make our most attractive Christmas trees, but they must be used almost immediately after they are cut.

Our native red cedar is really a juniper *(Juniperus virginiana)*. As in most junipers, some of its tiny leaves end in sharp points, making it rather scratchy to handle. The foliage is not as rich a green as that of the spruces and firs, but it is native here and the needles hold their color better than spruces. It was the commonest Christmas tree in St. Louis for many years. It is still for many Missourians the tree they will see in grandma's living room if they go home for the holiday.



Douglas spruce or fir *(Pseudotsuga taxifolia)*: Although uncommon in our area, the Douglas spruce is sometimes shipped in from the West for use at Christmas time. The beautiful cones are odd, but decorative.

Photo by Kenneth Peck

## II. CHRISTMAS DECORATIONS

For the last two decades more and more people have been decorating with branches of exotic evergreens which are not hardy here. They are shipped in from the South and the West Coast by florists, decorators, and Christmas tree merchants. For those living in apartment houses, they are often more practical than a tree.

Few botanists these days can name many of the handsome decorations they are asked to identify during the holiday season. The following list, far from complete, was made the week before Christmas in 1966. Common names (in CAPITAL letters) are given except when there are none.

1. *Araucaria excelsa*, NORFOLK ISLAND PINE.
2. Chamaecyparis, FALSE CYPRESS, also known as WHITE CEDAR.
3. Cryptomeria.
4. Cunninghamia, CHINA FIR.

Photo by Kenneth Peck

China fir *(Cunninghamia lanceolata)*: This exotic evergreen may be found in some St. Louis area stores selling Christmas decorations.

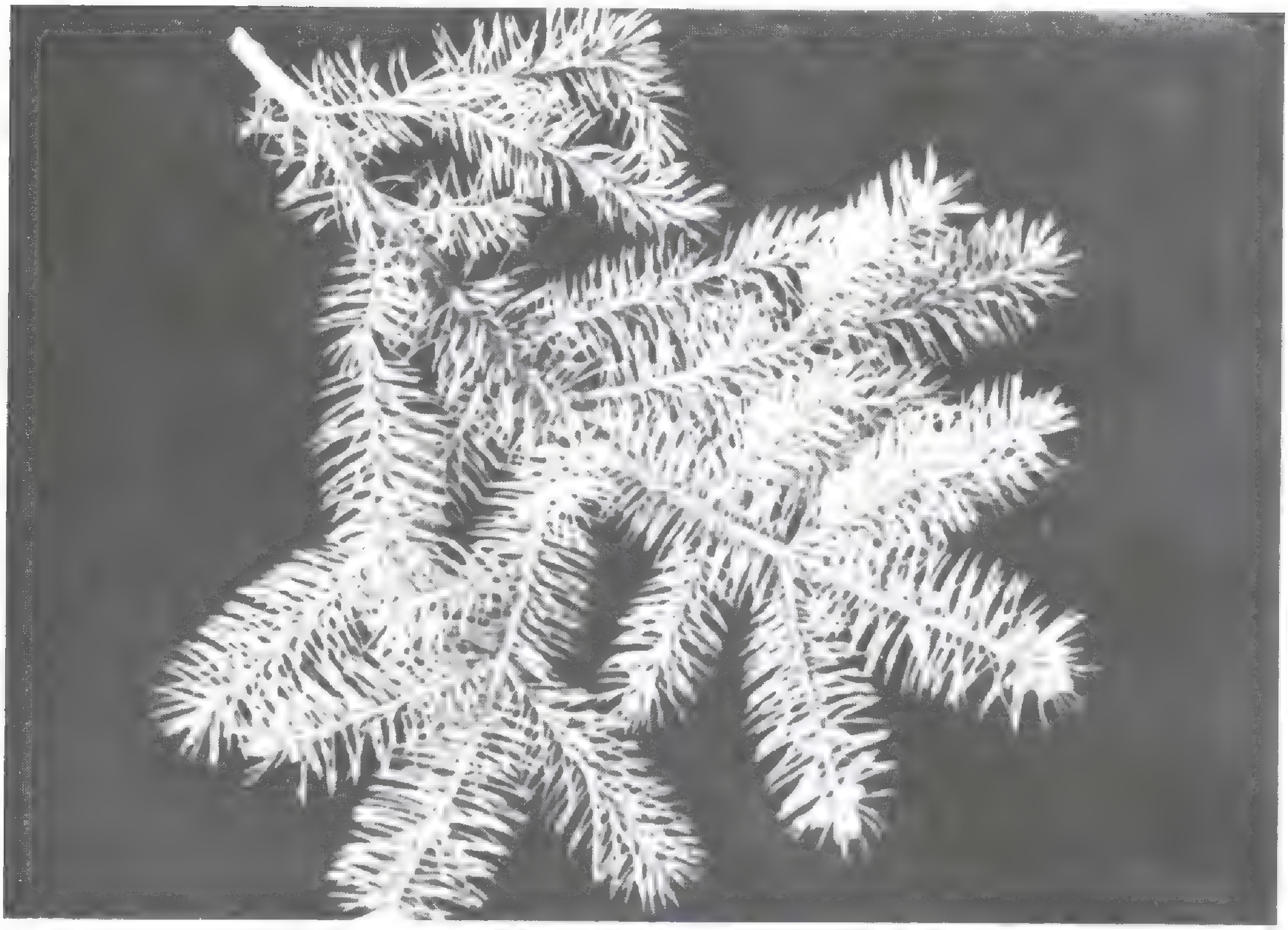


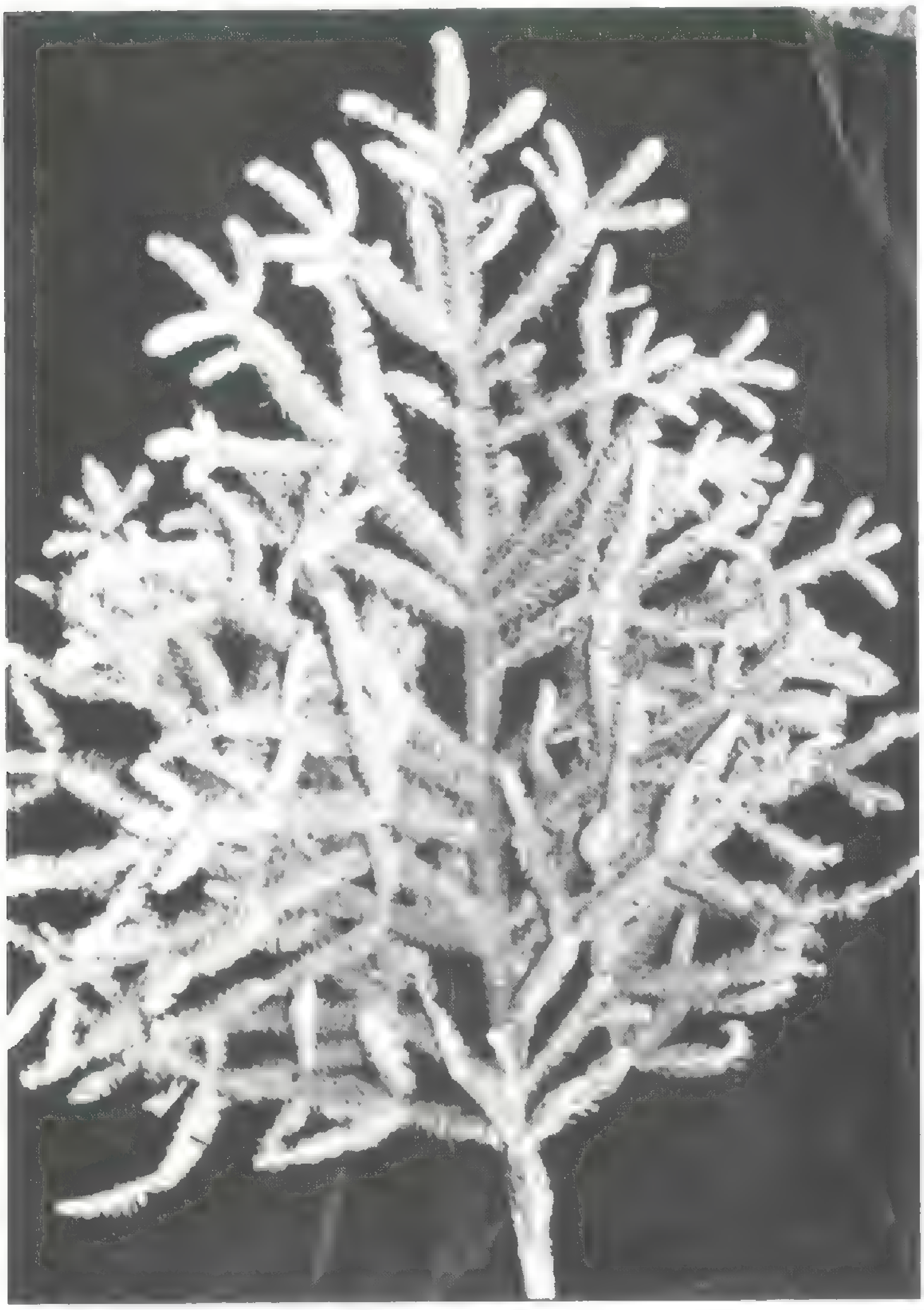
Photo by Kenneth Peck

Colorado blue spruce *(Picea pungens)*: The familiar and beautiful blue spruce may be seen in the Christmas decorations of many homes and public places.

5. Cupressus, CYPRESS (the true cypress with chunky-scaled cones).
6. Ilex, HOLLY, several species in sprays and wreaths of named varieties of ENGLISH HOLLY, grown in holly orchards in the West. This is widely sold over the counter locally, in addition to a big mail order business.
7. Juniperus, JUNIPER, several species and varieties including handsome gray-blue varieties from the Southwest.
8. Libocedrus, INCENSE CEDAR.
9. Podocarpus.
10. *Sequoia sempervirens*, REDWOOD, marketed as burls which have been kept in water and will give attractive sprouts for some time, though no roots.
11. Torreya, CALIFORNIA NUTMEG.

## III. The Seven Poisons of Christmas

Don't be alarmed; five of the seven have commonly been used at Christmas festivities for hundreds of years. All of them put



Colorado blue spruce *(Picea pungens)*: This photograph shows the very full-needled effect of the blue spruce, so well-known to all its admirers.

Photo by Kenneth Peck

together cause less grief than the aspirin tablets in our medicine cabinets and bed rooms. It is the flood of indispensable but dangerous "wonder drugs" that have made poison-centers a necessity and encouraged surveys of medical and botanical literature that make this brief account possible.

On the other hand, read carefully the detailed information below. Knowing about these poisons will keep babies and toddlers from being exposed to them. One is known to be dangerous to livestock and another has a bad record with saddle horses and animal pets.

The following information was digested from authoritative summaries in the Garden's Library as the general public has become increasingly aroused about poisonous plants during the last decade. Some of our readers may be interested in the well-illustrated book, *Deadly Harvest*, by John M. Kingsbury (Holt, Rinehart, and Winston, 1965). On page 128, the author summarizes botanical, medical, and chemical facts about the hundred poisonous plants most likely to be troublesome in this country. In this list, botanical names are given because in modern poison-centers and emergency rooms of hospitals, information is indexed under them, rather than under the common names.

*Buxus* (all species), BOXWOOD. Many kinds of animals have been killed by eating hedge clippings of boxwood.

*Euphorbia pulcherima*, POINSETTIA. The leaves are poisonous. A two-year old baby was killed by eating one leaf. Don't give up displaying these beautiful plants. In most homes it is easy to find a place where they are out of reach of the small fry during the Christmas season.

*Hedera helix* (all varieties). Commonly called ENGLISH IVY in this country. There are verified reports of children made ill by eating the leaves.

Canada balsam or balsam fir *(Abies balsamea)*: This evergreen is most commonly seen in Christmas tree lots in the St. Louis area. Both trees and branches for decorating are extensively used.

Photo by Kenneth Peck

*Kalmia latifolia*, MOUNTAIN LAUREL. The leaves are poisonous, particularly to livestock that browse them in quantity.

*Phoradendron* (all species), MISTLETOE. The beautiful little white berries are poisonous. This is the only one on this list for which we know of any poisonings in St. Louis. We were called one Christmas-time by a woman whose pet dog ate the berries where they fell on the floor and he became desperately ill.

*Solanum pseudo-capsicum*, JERUSALEM CHERRY. The seeds are poisonous. An ornamental winter potted plant with round red berries. It is similar to an ornamental variety of red pepper *(Capsicum)* which is not poisonous though children may inflame their eyes with its acrid juice after handling the plant.

*Taxus* (all species), YEW. The seeds in the little red berries are poisonous but the juicy part of the fruit is harmless. Hedge-clippings of yew are dangerous to livestock when thrown out to dry. In England it has been rated the most dangerous woody plant in the flora.

Some of these poisons were used in Europe in mid-winter rituals in pagan times. The Gauls, the Britons, the Celts, the Angles and the Saxons had great festivals then, celebrating the lengthening of the day. The mistletoe with its poisonous berries was a sacred plant, part of pagan mythology. Yew was probably brought to England in pagan times and is still associated with churchyards and burial ritual. Ivy and boxwood are probably not native to England.

Christmas as a Christian festival was not celebrated before 500 A. D. Even when it spread into the civilized world of that day, it came from the West by way of the early churches established there. Presumably it brought some of its pagan trappings along with it; we know, for instance, that the Angles began their year on December 25th. Boxwood, Ivy, Mistletoe and Yew might all have come along at this time. Poisons of one kind or another tend to have been venerated by primative man. A suspicious number of the world's important food plants were poisonous when they were first domesticated. The fine art of poisoning unwanted people has had a long history.

# BOOK DEPARTMENT

## PLANTS AND MAN ON THE SEYCHELLES COAST

### A STUDY IN HISTORICAL BIOGEOGRAPHY

Jonathan D. Sauer. (University of Wisconsin Press. 1967.)

*reviewed by* EDGAR ANDERSON

TO ONE who has seen the author's mother being a gracious hostess to three generations of Sauers and has noticed the genuine sparkle in her eyes it was pleasant to open a volume dedicated: "To a real salty beachcomber—my mother."

Jonathan Sauer's training in the fields where the histories of plants and of man come together was at Berkeley, California, and the Henry Shaw School of Botany. He now holds professorial status in Botany, Geography, and Anthropology at UCLA. He has become increasingly respected for his precise analyses of the effects of plants and man on each other and for his survey courses dealing with such matters.

The Seychelles are 200 islands and islets arching northwards and eastwards toward Indonesia. They have been of special interest for several reasons. It is becoming increasingly certain that at the end of the last glacial period they were a single flattish island many times the area of the present archipelago. Their flora comprised species never found elsewhere. To a scholar one of their assets is the vast store of detailed information about them, administrative reports, explorers' accounts, note books, and herbarium specimens. This record has been deftly sifted by Professor Sauer. He tells in the preface: "The vegetation looked disappointing at first. Only scattered natural stands have been left intact and extensive areas are blanketed by what seemed at first to be ordinary coconut plantations with a monotonous weedy undergrowth. It eventually dawned on me that this apparently uninteresting vegetation had a history that was extraordinary in its documentation. * * * Most unexpectedly all of the coconuts turned out to be no historic introductions but peculiar native varieties independently domesticated in the archipelago." He describes their vigor and productivity, their differences from ordinary seaborne coconuts, and the little yet known about the world's coconuts. To a subject outstanding for argument and conjecture, he brings such refreshing sidelights as: "The species behaves differently in the Indian Ocean. I have seen more volunteer coconuts sprouting in beachdrift on a single islet of Cocos-Keeling atoll than along hundreds of miles of Caribbean and Mexican Gulf Coasts."

# *GINKGO BILOBA,* THE GINKGO OR MAIDENHAIR TREE

### EDGAR ANDERSON

THE Garden has a number of fine old specimens of Ginkgo; there are several near the Climatron and the Floral Display House; there is a very large one just west of the Library and Administration Building; and an unusual one north of the Cleveland Avenue Gate House along the curving walk which leads to the Main Gate. The largest of these date back to Henry Shaw's day.

Most books and articles which mention the ginkgo stress the fact that it not known anywhere as a genuinely wild plant. Within the last decade this opinion has been successfully challenged by Dr. H. L. Li of the Morris Arboretum in Philadelphia. He fortunately is not only a botanist but an authority on early Chinese literature. By fitting together all the evidence from both fields, he has demonstrated convincingly the original wild home of the ginkgo and outlined its early history. It comes from south of the Yangtze River, along the Chekiang-Anwei border in a mountainous area less than 200 miles west (and a little south) of Shanghai. From this area it passed into cultivation in northern China in the last half of the eleventh century.

For millions of years ginkgoes were common in various parts of the world. They have a long fossil record going back to the days of the dinosaurs and persisting up to the glacial period. Numerous fossil species have been described, but they are all clearly ginkgoes. Nothing intermediate between them and other kinds of plants is yet known. Charles Darwin referred to our species as "a living fossil," a title which it merits, though this obscures the fact that among fossil plants it is nearly as much set off by itself (there *was* more than one species) as it is here in the Garden. It does have resin canals in its wood and contains technical features which to many botanists justify grouping it as a "Gymnosperm" with cycads, pines, yews, *Podocarpus* (spp.), monkey puzzle trees, and bald cypress. Yet even in that assemblage the ginkgoes stand way off by themselves.

For a tree with such a history it is surprisingly tough in the modern world. It has no pests or diseases. Perhaps it once had parasites but has outlived them. It is tolerant of soot and has been grown successfully in areas too smoky for anything else but the Tree of Heaven. On filled land in South Boston is was one of the few trees which did not die when its roots got down into salty subsoil.

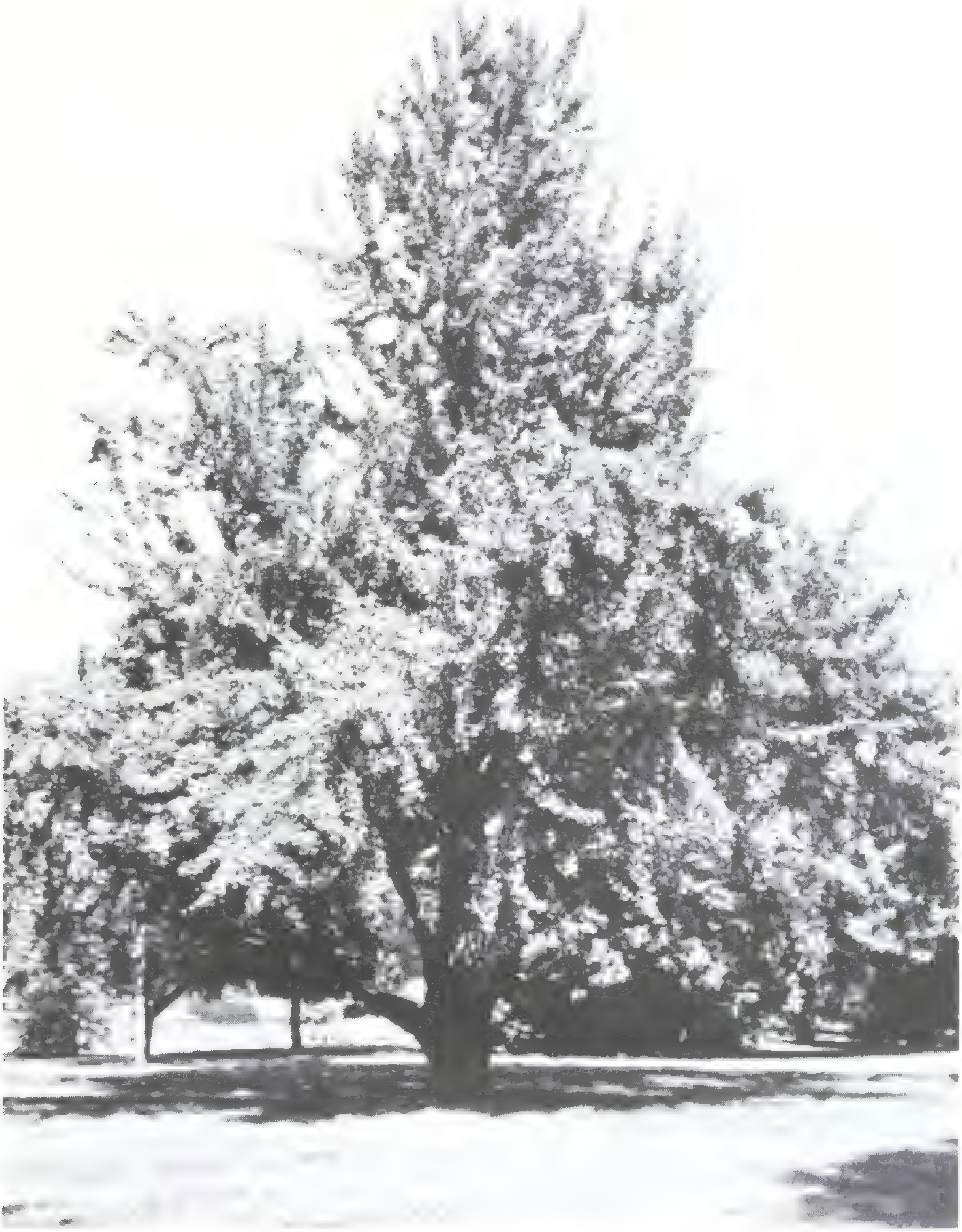


Photo by Barbara Lawton

This old ginkgo, planted by Henry Shaw, is beautiful at any season. Often called "the children's tree," it is between the mausoleum and the new rose garden. The unusual low branching is due to earlier damage to the main trunk.

Like pines and spruces it holds fairly rigidly to a few simple growth patterns. In spite of its graceful foliage, young and even middle-aged trees have a stiffish look. In many ginkgoes, until they get so big that gravity pulls them down, branches either go almost straight up or grow outward at an angle of close to 45 degrees. In the Sentry variety selected for avenue planting most of the branches turn upwards, giving a neat appearance.

Young specimens can sometimes be distressingly severe for a decade or more. One tree in South St. Louis, planted between two houses which were fairly close together, continued to grow up and up, looking like a tall living flag pole. When killed back, ginkgoes can send out branches a few feet above the ground level. The most curious example of such a variant is "the children's tree", an old ginkgo between the mausoleum and the new rose garden. It has thick branches just a foot or so above ground level and they have given rise to still other branches, so there is now a full circle of long, almost horizontal ginkgo limbs with a large central trunk shooting up in the middle. In spite of rules and regulations, the children long ago adopted this tree as their own. They can easily boost and pull each other up into it and readily make their way along the big radiating limbs. The bark of the whole lower portion of the tree has been smoothed and polished by this traffic, and it is a unique and handsome specimen. Real damage to the tree has been slight; our chief concern has been that over-venturesome children, unfamiliar with the soft wood of the ginkgo, would get out on one of the side limbs and with a sudden snap find themselves on the way to the ground. Fortunately, there have been few such accidents. Pruning the broken stubs back smooth with the main branch has produced a tree which is as safe for children as anything could be in this kind of a world.

Old ginkgo trees are nearly always picturesque; most of them become beautiful, even in the winter time when they show nothing but the pattern of their branches. The wood of the smaller branches is so soft that a big tree will lose branches up to a yard long in every severe windstorm. Each of these accidents stimulates sprouting in the vicinity of the break and produces a rosette of actively growing branches; the bigger the limb that was blown out, the bigger the rosette. In some old trees much of the crown is formed from these bursts of renewed vigor, giving a rhythmic coherence to its complex pattern.

In Japan they are treasured as one of the features of temple gardens. They may send up sprouts around the base of the tree that eventually fuse with the main trunk and produce a fantastic ribbed appearance. The tree in back of the Cleveland Avenue Gate House has begun to send up such sprouts and the largest of them are now half a foot in diameter. Growing up into the shade of the upper branches, they are less stiff than the original trunk. They bend back and forth a little as they make their way up but stay close to the trunk. Their leaves have somewhat the appearance of those on vigorous ginkgo seedlings. They are much larger, more slender, much more deeply and frequently cut, and more variable. It almost looks as if a new kind of ginkgo *vine* were growing up the old ginkgo tree.

An even stranger feature of some old Chinese and Japanese trees must be a sign of really advanced age, for it has not yet begun to show in any of our oldest trees; this is a downward woody growth from some of the lower limbs, a kind of wooden stalactite. It is somewhat as if the picturesque wooden "knees"

Photo by Barbara Lawton

Children long ago adopted this tree, in spite of rules and regulations. It is hard to resist climbing such a tree, and the gnarled bark of the lower portion has been smoothed and polished by this traffic.

of old southern cypresses were to grow down from branches instead of up from roots.

The ginkgo is one of those trees in which the division of sexes is as marked as among mankind. A mature male tree may bear pollen on a majority of its spurs. Pollination occurs only in the spring before the buds as a whole are fully unfolded or expanded. The pollen occurs in stamens, organs enough the shape and size of stamens in flowering plants, to make you suspect that is what they are. When the pollen is ready, it is carried away by the wind to fertilize the female trees. When conditions are just right, you actually see it being blown away. It takes a warm sunny still day with little breezes from time to time. When one of them hits a region of sexually active spurs, there are tiny puffs of greenish-yellow smoke here and there.

In female trees the sexually active spurs are even more concentrated in the top branches than in male trees. It is not easy to find the female flowers, if we may use a term which scarcely applies to them. They arise from the tips of the spurs on slender stalks. Two green peas at the top of a flat green toothpick would approximate their size and appearance. By midsummer they look like small green olives.

As they ripen they become larger, almost yellow with a surface texture like parchment or plastic. They are about the size and shape of a small plum, like a plum in having a hard stone within but soft flesh on the outside. They might easily be taken for a plum if it were not for their odor. The ripe flesh is impregnated with the same chemical (butyric acid) which is in rancid butter and some kinds of old cheese. It persists for months. Since a big tree may bear a bushel or two of seeds, these ripe seeds are nearly always a problem, whether the ginkgo is in a park, on a campus, or planted along an avenue. It is now possible to purchase young ginkgoes which have been raised from cuttings taken from male trees. They cost more, but you can plant one of these without feeling that you are creating a neighborhood problem in years to come.

The final chapter in the story of these ginkgo seeds is ironic, considering what a nuisance they can be year after year. The kernel within the central nutlet is edible and the nutlet is easy to open once you have removed the acrid flesh. They are used for food in the Orient, and early in their horticultural history were sent as tribute to the emperor. A distinguished Japanese botanist once showed us how to prepare them. After the nutlets have been cleaned, they need to be cooked either by roasting or by boiling.

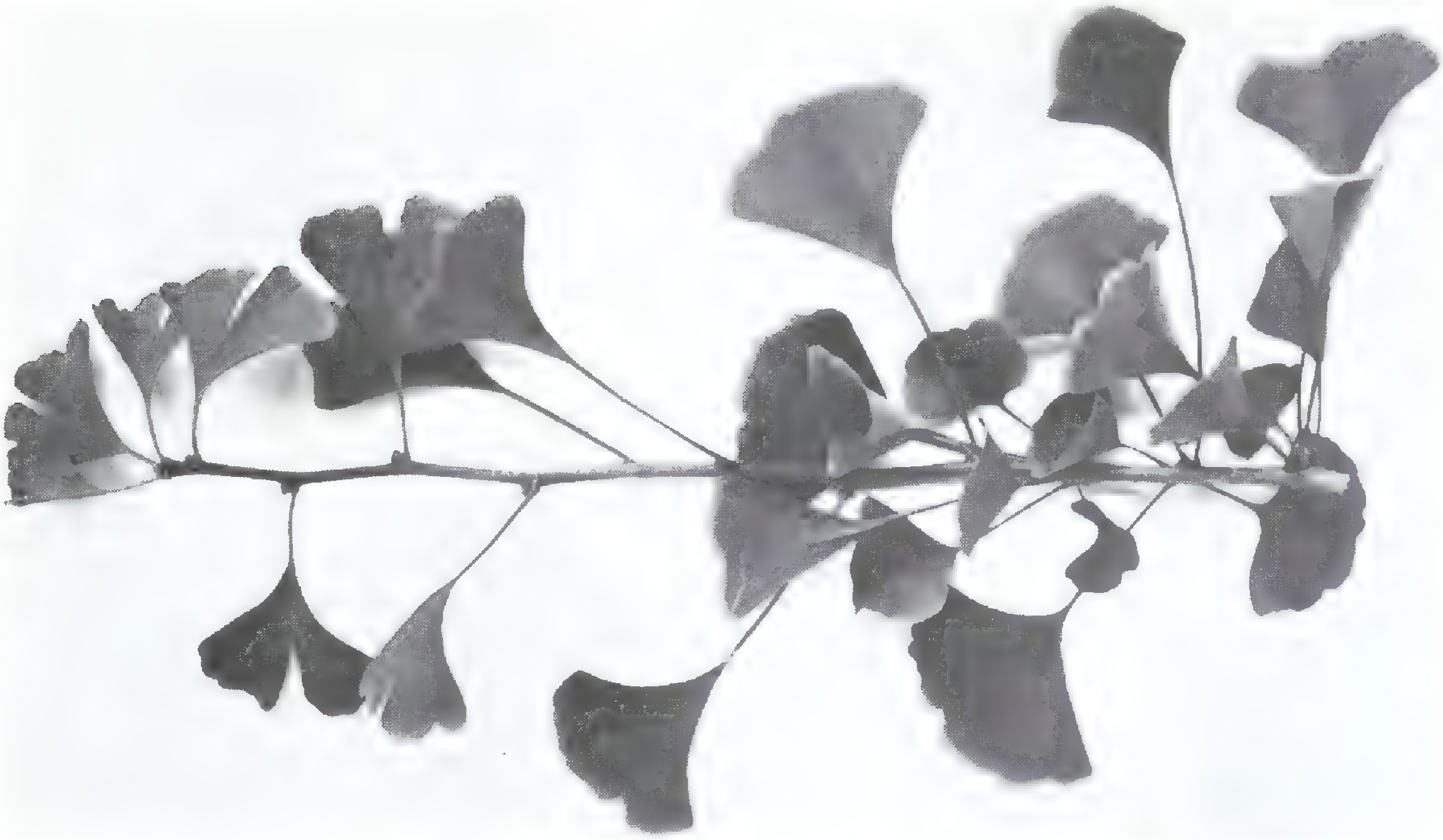


Photo by Claude Johnston

In England the name "maidenhair tree" is frequently applied to the ginkgo, as its fan-shaped leaves look somewhat like a greatly enlarged segment of a maidenhair fern.

Then the kernels are removed and are sliced or chopped. To us they tasted like slightly tougher, less flavorful almonds. I should imagine that in those oriental recipes which combine chicken and sliced almonds, ginkgo kernels might be better than almonds once you learned exactly how to use them. They would be more dominated by the chicken flavor though presenting a nutlike texture.

St. Louis is just far enough south so that ginkgoes are not only hardy but grow well here. The golden autumnal color of the ginkgo needs a long time to develop and is most spectacular in years with a late killing frost. It develops slowly, until, in St. Louis, it becomes a true Chinese Imperial Gold, which is a slightly dull or brassy gold. If heavy frosts do not come, the golden leaves hang on amazingly, only a few dropping each day. When finally there is a killing frost, the leaves begin to fall about breakfast time and come down steadier and steadier; by afternoon the tree is bare. When this happens on a day of almost no wind, the leaves fall straight down, forming a thick, well-defined carpet of exquisite color.

It is the great size of the tree in combination with the golden color that makes old ginkgoes so noteworthy in their best autumns. On a clear, sunny day they reflect golden light all day long. If one is working nearby, he has the sensation of living through the hours in golden glory.

# WHO, WHAT, WHERE, WHEN

WELCOME TO: Dr. Will Hoyle Blackwell, Jr., who joined our staff this summer, June 15, as Research Associate to work on the *Loganiaceae* and *Asclepiadaceae*, for the Flora of Panama. His B.S. degree, taken in 1961 in Zoology at Mississippi College, Clinton, Mississippi (near Jackson, his home town), was followed by a Master's Degree in 1963 in Biology at the University of Alabama, and then by a Ph.D. in Botany in 1967 at the University of Texas in Austin where he specialized in taxonomy, writing his thesis on the genus *Bouvardia* under Dr. Marshall C. Johnston. Dr. Blackwell is married and resides in St. Louis County with his wife and one child.

Dr. Thomas Bernard Croat, who is doing postdoctoral work as a Research Associate on the Flora of Barro Colorado Island (Canal Zone) project. Dr. Croat toured the west coast as far south as Mexico and Panama City after his graduation from Simpson College in Indianola, Iowa, with a B.S. in biology in 1962. He then taught general and physical science at St. Thomas and the Virgin Islands for a year which gave him an opportunity to visit and collect plants in Puerto Rico, Hispanola, and Jamaica. At the close of the school year he took an extensive tour of Latin America before returning to the States to study for his M.A. and Ph.D. in botany at the University of Kansas. He completed his Ph.D. in 1967.

Miss Patricia Elizabeth Putman from Clinton, Tennessee. Pat took both her B.A. and M.S. degrees in biology at Emory University in Atlanta, Georgia. She is interested in botanical evolution in its relation to genetics and systematics and will assist Dr. Lewis with his manuscripts and with the ANNALS.

* * *

MBG EXPEDITION TO TROPICS scheduled under Air Force grant: Five staff members from the Missouri Botanical Garden will leave December 1st on a three week expedition to the Republic of Panama financed by the U. S. Air Force Office of Scientific Research. This, the second such expedition, will include Drs. Walter H. Lewis, André G. Robyns, John Ridgway, Will H. Blackwell, and Thomas B. Croat. Air Force helicopters will again be used to collect plants in the more remote and inaccessible parts of the Republic. These specimens are the raw material for the Flora of Panama series published in the ANNALS OF THE MISSOURI BOTANICAL GARDEN and are available to any qualified student of tropical flora. To see first hand the actual growing conditions and habits of plants is essential for accurate botanical descriptions when the flora of a particular region is being studied and written up for the first time. That is why expeditions are so vital to any "going" botanical garden.

* * *

AUGUST EXPEDITION TO PANAMA: In August, Dr. John D. Dwyer headed an expedition to Panama with two graduate students, Tom Elias and Sister Marie Victoria Hayden from St. Louis University, under the National Science Foundation Flora of Panama grant. They spent four weeks collecting nearly all over the country some 1500–2000 numbers for the herbarium along with 3–4 duplicates of each number for exchange. A third St. Louis University student, Joe Kirkbride, not under the grant, went along and supplied the photographic talents for the group. Several rather rare plants were brought back fresh for display in the Climatron, including a black Anthurium (Arum family).

* * *

ISLAND OF SURTSEY: Dr. David Gates visited the newborn island of Surtsey on June 25, 1967. This volcanic island off the southern coast of Iceland rose above sea level in November, 1963. Now dormant, but still steaming, it is about half the size of New York's Central Park. The story of this island in the making is being minutely recorded by modern scientific methods. Studies over the next years will help in understanding how life is transferred from island to island.

* * *

PARÁ TEAM: On August 15, nine civic, education, and business leaders from the state of Pará, Brazil, visited the Garden. Here for a two week stay in Missouri, they are the Pará Team of the Partners of the Alliance for Progress

Photo by Barbara Lawton

The Pará Team, enjoying a tour of the Garden.

program, which is the person-to-person portion of the Alliance for Progress, established in 1961 at the Punte del Este Conference. Pará is Missouri's sister state under this program. The St. Louis Council on World Affairs made all arrangements and acted as host. The men were here to acquire knowledge of modern techniques to stimulate social change and economic growth in the developing Amazon basin.

* * *

INSTITUTES OF BIOLOGICAL SCIENCES: Drs. David Gates and Walter Lewis attended the American Institutes of Biological Sciences meeting at College Station, Texas, in the latter part of August. Dr. Gates was elected Chairman of the Steering Committee of the Flora of North America. He was also elected to the Science and Public Policy Committee of the Ecological Society of America. This committee is set up to advise congressional leaders, the White House, and other government agencies concerning ecological measures.

* * *

VP QUEEN'S RECEPTION: On Sunday afternoon, October 8, the traditional Veiled Prophet Queen's Reception was held at Tower Grove House. Mrs. Richard Hawes III, Hospitality Chairman for the Friends of the Garden, arranged the reception, which gave St. Louis school children an opportunity to meet the VP Queen in person.

* * *

AN OPERA GALA: This elegant musical affair was held on October 20 in the Floral Display House. The Richmond Heights Symphony, directed by Dr. Henry Orland, and the Repertory Opera Singers performed selections from light and grand opera.

* * *

DIRECTOR'S APPOINTMENT: Dr. Gates has been invited to serve on the Advisory Board for Biological and Medical Sciences of the National Science Foundation.

* * *

SYSTEMATICS SYMPOSIUM: The 14th annual Symposium on Systematics was held at Missouri Botanical Garden on October 13–14. About 200 botanists and zoologists met to discuss the subject: Animals and Plants Associated with Man. Most of the biologists came from the Midwest, but some came from institutions on both coasts and Canada. The Symposiums bring together informally all kinds of systematists (those who study classification, nomenclature, evolution, and related subjects) in an ideal atmosphere for the exchange of ideas and knowledge. The Symposium was again supported by the National Science Foundation, and organized by a committee headed by Dr. Hugh Cutler.

* * *

# *friends of the garden*

Photo by Claude Johnston

Christmas presents, such as this copper flower—for your favorite people, are sold by the Garden Gate Shop.

WELCOME to our *NEW* Friends! There were 79 added in June, July, and August.

Starting *NOW*, there is a Friends' contest with *PRIZES*, for those who get the most new members by June 1, 1968.

The Shop did extremely well over the summer. Did you see the Redbird window at the time of the World Series? Can you believe it was only two years ago Mrs. John Hayward and Mrs. John Wallace began the Garden Gate Shop? (A much appreciated helping hand was given by the Tower Grove Shop which had recently closed.) A spectacular profit was made that first year despite the initial problems of starting a new venture.

We are sure you are all buying your Christmas presents at the November Preview three-day sale. At the Preview there will also be popular music by a three piece combo and craftsmen and artists at work. (Friends who will help sell, please call Mrs. Leighton Morrill, WY. 3-3445. We need you!)

We provided hostesses for *An Opera Gala*, held in the Floral Display House, October 20, and also when the National Trust came to the Garden on October 21.

— Exciting projects are in the making! — See you at the Preview Parties! Enter the Friends' Membership Contest!

# *GARDENING IN ST. LOUIS*

## NOVEMBER AND DECEMBER

GARDENERS begin to focus on indoor gardening projects at this time of year. House plants may be rooted in pots of sand, terra-lite, perlite or some, like philodendron, in water. Move house plants away from windows on subzero nights.

Clean, lightly oil, and store garden tools, making necessary repairs.

A cold frame is an excellent place to store plants needing protection during the winter; bulbs for winter bloom, foxgloves, canterbury bells, clumps of choice hardy chrysanthemums and many other perennial plants. Bonsai specimens winter well in a cold frame. Surround the plants with leaves. The coarse leaves of oak and sycamore are best for this mulching. Shade the cold frame with laths which permit rain and snow to enter, but reduce the sun's rays.

Pot bulbs of hyacinths, narcissus, and tulips for indoor bloom. After pots are placed in the cold frame, water thoroughly before covering for the winter. A half-inch of sand spread over the top of the pots before covering with soil or mulching material will facilitate lifting the pots in late winter when bringing them indoors.

Mow lawns as long as the grass grows, especially bluegrass. Keep lawns free from leaves. Make compost heaps if city ordinances allow. These can be added to with each raking.

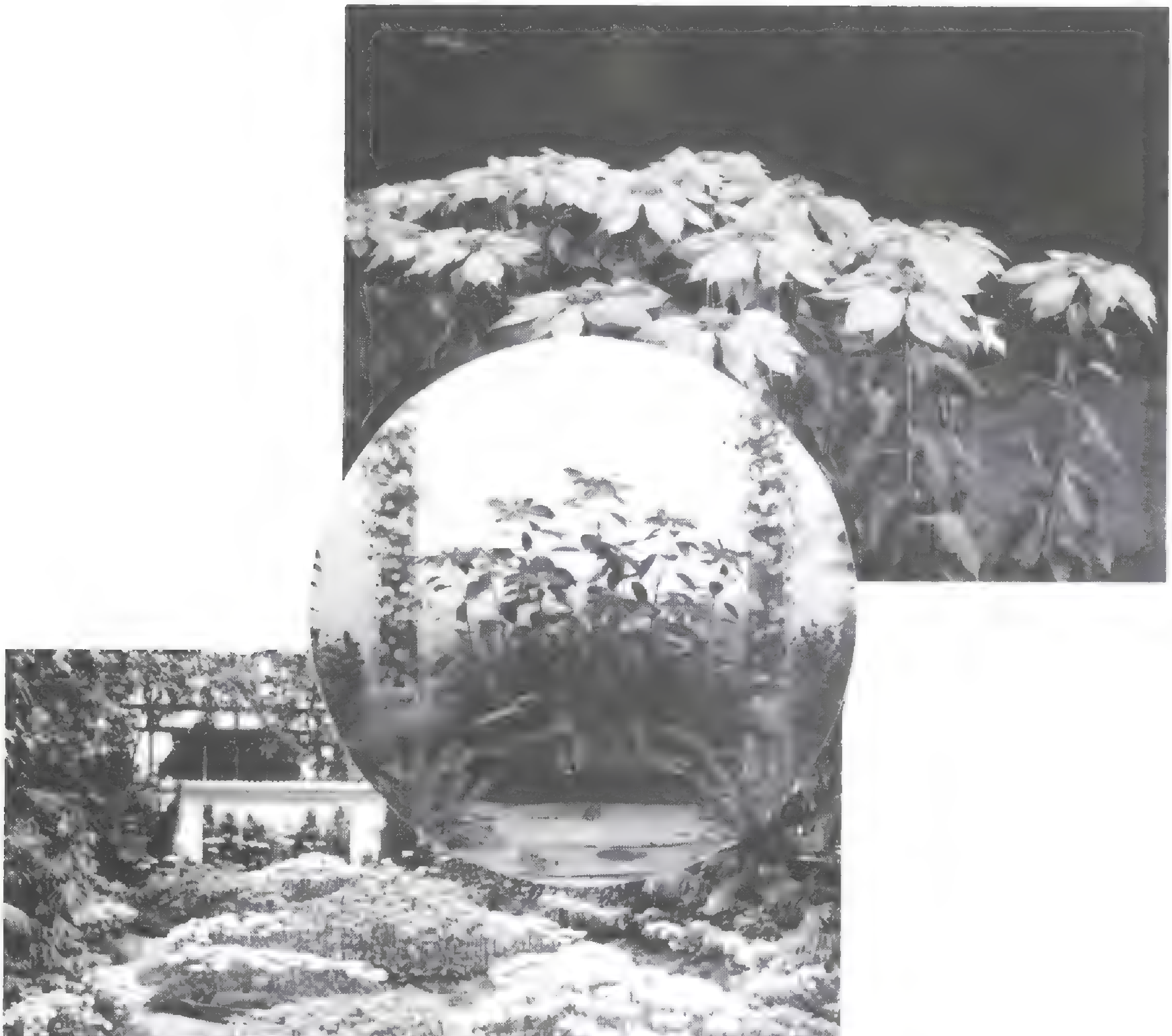
Continue to water shrubs and evergreens, as necessary, until soil freezes. You can plant dormant nursery stock as long as the ground is not too wet or frozen.

After heavy frost, whack the roses off to three feet high. Mound up the plants with two or three shovels of soil or sawdust. The idea is to keep the cold in, not out. It's the quick thawing that hurts roses.

If you begin feeding the birds, you must continue, as they come to rely upon your handouts.

Snip evergreens carefully for use as Christmas decorations. American holly is not harmed by generous, but judicious, pruning.

# POINSETTIA SHOW



Photos by Paul A. Kohl

The traditional Poinsettia Show ushers in the Christmas season at the Missouri Botanical Garden on December 3 and will run through January 7. Designed and executed under Paul Kohl's direction, this show is, as always, in the full spirit of the holiday season.

Shown here, in photographs by Mr. Kohl, are scenes from past Christmas floral shows.

# ENCORE! ST. LOUIS HERB SOCIETY FALL HARVEST SALE TO BE REPEATED

By popular request the Herb Society will repeat its Fall Harvest Sale of herb products. Last year when this event was held for the first time in the Museum Building it was a virtual sell-out in two hours, leaving early afternoon shoppers disappointed. This year the sale—which will be held on Friday, Nov. 10—will open at 10 a.m. and run until 2 p.m. Society members have worked long and hard throughout the summer harvesting herbs from the Garden at the rear of Tower Grove House, as well as their own gardens, and making a variety of delicious herb products to tempt herb enthusiasts and holiday shoppers alike.

Photo by Mary Gamble

A sextet of herb ladies, during a workshop at the home of a member, work on a project for the always popular Herb Society Sale.

This fall's Harvest Sale will concentrate on culinary items, including such Herb Society specialties as curry powder, seasoning salt, tea-pourri, mustard, etc. All products are made by members according to proven recipes. As the Society says, "Any product which bears the Herb Society label must be the *best*." Items made in special home workshops or in individual members' kitchens are: herb vinegars, herb jellies; pickles, preserves and conserves; chutneys, mint sauce, poultry seasoning, etc. Some of the most-used herbs have been "kitchen-dried" and packaged in small-sized containers to allow the adventuresome cook to experiment widely. There will also be a tantalizing array of herb and other homemade breads. The Herb Society's best-seller Cook Book, now in its third edition, will also be on sale.

Society members manning the sale can be identified not only by their enthusiasm but also by their specially designed herb aprons. Shoppers can enjoy (for a small fee) the famous Chowning Tavern Punch.

Sale proceeds will go into the Society's educational fund which, in the past, has financed such projects as the Herb Garden and the Cook Book, all designed to serve the Society's purpose which is to "further the use and knowledge of herbs."

1954
THE
ST. LOUIS
HERB
SOCIETY
FOR USE and
KNOWLEDGE

# TOGETHER . . . FOR THE FULL LIFE

The Arts and Education Council of Greater St. Louis is best known as the organization which operates the annual Arts and Education Fund campaign. For the past five years the Council has carried out this united appeal in St. Louis on behalf of ten organizations including Shaw's Garden. When it started, the Fund raised half a million dollars a year. In 1967 the Fund will raise more than three quarters of a million dollars for its member organizations. Shaw's Garden, as the third largest beneficiary, will receive $80,000 when the Fund goal is achieved.

## COUNCIL SEEKS FUNDS OUTSIDE ST. LOUIS

The Council also carries out other less well-known functions on behalf of the arts and education in St. Louis. It has been active in seeking funds from Federal and State sources and from the national foundations for programs in St. Louis. It seeks to ensure that if funds are available nationally, St. Louis receives its share.

## ARTS DEVELOPMENT AGENCY ESTABLISHED

The Council has recently established an Arts Development Agency through which it channels Foundation and other Funds to its eighty-eight member organizations including those which do not benefit directly from the Arts and Education Fund. One of the grants make this year included funds for the Garden Education Department to bring deprived children from various parts of the metropolitan area to Children's Saturday Nature Programs, to print two booklets for class use, and to prepare live plant materials for the children.

## MONTHLY CALENDAR OF CULTURAL EVENTS

An important role of the Council from the beginning has been its provision of joint publicity and administrative services for its member organizations. Foremost among these is the Monthly Calendar of Cultural Events which is mailed each month to schools, libraries, hotels and other public places, as well as to the more than 10,000 individual contributors to the Arts and Education Fund.

## COMMON VOICE FOR ARTS AND EDUCATION

The Council, like Shaw's Garden itself, is supported by those people of St. Louis who give to the Arts and Education Fund. Its slogan, "together . . . for the full life," expresses the philosophy behind the Fund—that it is the total climate of opinion which in the end determines the health and vitality of the arts in any community.

# THE PITZMAN PROGRAM

Photo by Kenneth Peck

AT FIRST glance this is a small boy, very intent upon transplanting a seedling at a session of the Pitzman Summer Nature Study Program. This may also be the first photo of a botanist working in his chosen field. Or it may be an early picture of a business man who relaxes through gardening or through an active interest in the Missouri Botanical Garden.

# THE MISSOURI BOTANICAL GARDEN CALENDAR

## (November and December, 1967)

| | |
|---|---|
| November 3 | Chrysanthemum Show: Preview Party for Friends of the Garden. 5:30–7:30 p.m. in the Floral Display House. |
| November 3–5 | Garden Gate Shop: Special displays and sale of Christmas and gift items in the Amateur Display House, in conjunction with the opening of the Chrysanthemum Show. |
| November 4 | Children's Saturday Nature Program. "Bird Feeders." (Bring an empty half-gallon milk carton.) Admission is free. 10:00–11:30 a.m. |
| November 5–26 | Chrysanthemum Show |
| November 7, 14, 21, 28, Dec. 5 | Winter Botany. This study of trees will be taught by Dr. Edgar Anderson and Kenneth Peck in the Museum Building. Friends of the Garden, $9.00; $12.00 to others. 7:30–9:30 p.m. |
| November 10 | Fall Harvest Sale (St. Louis Herb Society). 10:00 a.m.–2:00 p.m. in the Museum Building. |
| November 11 | Children's Saturday Nature Program. "Fun with Fruit." Admission is free. 10:00–11:30 a.m. |
| November 14<br>Also given on<br>November 16 | At 10:00 a.m.–3:00 p.m. Succulents and Dish Gardens The culture and care of unusual cacti and succulent plants will be taught by Lad Cutak in the New Growing Houses. (Bring your own dish garden container.) The fee for one session will be $8.00 for Friends of the Garden; $10.00 to others. |
| November 18 | Children's Saturday Nature Program. "Ants in Your Plants." Admission is free. 10:00–11:30 a.m. |
| November 25 | Children's Saturday Nature Program. "Winter Window Vegetable Gardens." (Bring rigid container about 10″ by 10″ by 3″ deep.) Admission is free. 10:00–11:30 a.m. |
| December 1 | Poinsettia Show: Preview Party for Friends of the Garden. 5:30–7:30 p.m. in the Floral Display House. (Christmas music by the Repertory Opera Singers.) |
| December 2 | Children's Saturday Nature Program. "Insectivorous Plants." Admission is free. 10:00–11:30 a.m. |
| December 3, 1967, through January 7, 1968 | Poinsettia Show. |
| December 9 | Children's Saturday Nature Program. "Making Christmas Cards." Admission is free. 10:00–11:30 a.m. |
| December 16 | Children's Saturday Nature Program. "Christmas Wreaths." (Bring a wire coat hanger bent into a hoop.) Admission is free. 10:00–11:30 a.m. |
| December 30 | Children's Saturday Nature Program. "Nature Movies." Admission is free. 10:00–11:30 a.m. |

(Call TO. 5-0440 for further information.)

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MISSOURI BOTANICAL GARDEN 1859

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## GARDEN STAFF

David M. Gates, Director
Edgar Anderson, Botanist
Clarence Barbre, Instructor
Clifford Benson, Plant Breeder
Will H. Blackwell, Jr., Research Associate
Derek G. Burch, Chief Horticulturist
Thomas B. Croat, Research Associate
Ladislaus Cutak, Horticulturist and Manager of Public Relations
Hugh C. Cutler, Curator of Useful Plants
John D. Dwyer, Research Associate
Waldo G. Fechner, Secretary of Board and Controller
Raymond Freeborg, Research Associate
James Hampton, Chief Engineer and Superintendent of Operations
Claude Johnston, Grower, Floral Displays
Paul A. Kohl, Floriculturist
Charles Kreher, Grower, Linnean Garden
Mrs. Barbara Lawton, Editor of Bulletin
Walter H. Lewis, Director of the Herbarium
Eugenia Maddox, Librarian
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Mark W. Paddock, Administrative Assistant to the Director
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André Robyns, Visiting Curator, Flora of Panama
Alfred Saxdal, Rose Grower
Owen J. Sexton, Research Ecologist
Frank Steinberg, Superintendent of the Arboretum, Gray Summit
Susan Verhoek, Senior Herbarium Assistant

# VISIT YOUR
# MISSOURI BOTANICAL GARDEN

## (SHAW'S GARDEN)

THE Missouri Botanical Garden's main entrance is at Tower Grove and Flora Place. The Garden is served by both the Sarah (No. 42) and the Southhampton (No. 80) city bus lines.

The Missouri Botanical Garden Arboretum—1600 acres—established at Gray Summit, Missouri, in 1926, is open to the public.

The Garden—70 acres—is open every day except Christmas and New Year's. For the main entrance, grounds, Climatron, display greenhouses, and Floral Display House:

| | |
|---|---|
| May 1 through October 31 | 9:00 a.m. to 6:00 p.m. |
| November 1 through April 30 | 9:00 a.m. to 5:00 p.m. |
| Sundays and Holidays | 9:00 a.m. to 7:00 p.m. |

For Tower Grove House:

| | |
|---|---|
| May 1 through October 31 | 9:00 a.m. to 5:00 p.m. |
| November 1 through April 30 | 10:00 a.m. to 4:00 p.m. |

The Display House presents four major shows: November, Chrysanthemums; December, Poinsettias; February, Orchids; April, Spring Flower Show. During the year other shows, competitions, and festivals are sponsored by various garden clubs and flower societies.

Courses in botany and horticulture for adults are conducted by the Garden staff. Children's nature classes are provided free on Saturdays from mid-September to early June. The Pitzman Nature Program is held for children during the summer. The Garden is world famous for its scientific research program. The scientists of the Garden hold teaching appointments on the staff of Washington University.

The Missouri Botanical Garden was established for the public's benefit in 1859 by Henry Shaw. The Garden, a non-profit institution, relies for support solely upon contributions from the public, the Arts and Education Council, and income from the Shaw estate. The Garden receives no city or state tax support.

Support your Garden and take part in Garden activities through the Friends of the Garden. Information may be obtained from the Main Gate or by mail or phone. (TO. 5-0440)

(145)